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First report on the protection of the atmosphere

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I. Introduction

A. Inclusion of the topic in the programme of work of the International Law Commission

1. At its sixty-third session, held in 2011, the International Law Commission endorsed the inclusion of the topic "Protection of the atmosphere" in its long-term programme of work. The syllabus, containing a brief outline of the topic and a selected bibliography, was annexed to the report of the Commission submitted to the General Assembly at its sixty-sixth session (see A/66/10, annex B).

2. At its sixty-sixth session, the General Assembly, in its resolution 66/98 on the report of the International Law Commission on the work of its sixty-third session, inter alia, took note of the inclusion by the Commission of the topic "Protection of the atmosphere" in its long-term programme of work.

3. During the consideration by the Sixth Committee of the report of the Commission, a number of representatives welcomed the inclusion of the topic in the Commission's programme of work. These representatives expressed their keen interest in the subject.[1] Some also expressed a desire for the Commission to give priority to the topic.[2] The view was also expressed that the "topic of protection of the atmosphere addressed a growing global concern" and that an "effort by the Commission to take stock of rules under existing conventions and to elaborate a new legal regime would be commendable".[3] Another delegation expressed a concurring view, going on further to state that the "deteriorating state of the atmosphere made its protection a pressing concern".[4] It was hoped that the Sixth Committee would give strong endorsement to the topic to be taken up by the Commission. Support was given in respect of the Commission's foray into new areas of international law, with one representative stating that the Commission was now entering some areas of international law which it had never addressed before, such as the environment, humanitarian law and investment law and that the policy reflecting the current development of international law and the interests of the international community promised to bring very useful results.[5] It was noted that the protection of the atmosphere was "most deserving of attention as [it] addressed fundamental aspects of environmental protection", a field in which there was no lack of international instruments or scholarly attention, but where there was "a need for further review and systematization in order to respond to the growing concerns of the international community".[6] Some representatives, however, expressed concerns as to the

[1] For example, Denmark (on behalf of the Nordic countries) (A/C.6/66/SR.18, para. 30), Canada (A/C.6/66/SR.19, para. 46), China (A/C.6/66/SR.19, para. 15), Nigeria (A/C.6/66/SR.20, para. 85), Poland (A/C.6/66/SR.20, para. 64), Slovenia (A/C.6/66/SR.20, para. 9), Spain (A/C.6/66/SR.27, para. 37), Sri Lanka (A/C.6/66/SR.27, para. 29) and Algeria (A/C.6/66/SR.28, para. 50).

[2] Denmark (A/C.6/66/SR.18, para. 31) and Poland (A/C.6/66/SR.20, para. 64).

[3] Austria (A/C.6/66/SR.19, para. 4).

[4] Japan (A/C.6/66/SR.18, para. 63).

[5] Czech Republic.

[6] Italy (A/C.6/66/SR.26, para. 43). Slovenia also noted that the topic was of particular relevance (A/C.6/66/SR.20, para. 20).

feasibility of the topic owing to its "highly technical issues".[7] With regard to codification and progressive development, it was hoped that the topic's "highly technical nature would not render the exercise futile".[8] The view was also expressed that since "the current structure of law in that area was treaty-based, focused and relatively effective, and in light of the ongoing negotiations designed to address evolving and complex circumstances, it would be preferable not to attempt to codify rules in that area at present".[9] The Special Rapporteur takes such criticisms very seriously and has tried to address the concerns in the present report. It is his sincere hope that the Member States will be convinced that the protection of the atmosphere is an important and appropriate topic for the Commission to address.

4. At its sixty-fifth session, held in 2013, the Commission decided to include the topic in its current programme of work and appointed Mr. Shinya Murase as Special Rapporteur for the topic (see A/68/10, para. 168).

5. The Commission included the topic on the following understanding (see A/68/10, para. 168):

(a) Work on this topic will proceed in a manner so as not to interfere with relevant political negotiations, including those on climate change, ozone depletion, and long-range transboundary air pollution. The topic will not deal with, but is also without prejudice to, questions such as the liability of States and their nationals, the polluter-pays-principle, the precautionary principle, common but differentiated responsibilities, and the transfer of funds and technology to developing countries, including intellectual property rights;

(b) The topic will also not deal with specific substances, such as black carbon, tropospheric ozone, and other dual-impact substances, which are the subject of negotiations among States. The project will not seek to "fill" the gaps in the treaty regimes;

(c) Questions relating to outer space, including its delimitation, are not part of the topic;

(d) The outcome of the work on the topic will be a set of draft guidelines that do not seek to impose on current treaty regimes legal rules or legal principles not already contained therein;

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[7] It was noted that the topic appeared to be a highly technical topic, many aspects of which lay outside its areas of expertise (France, A/C.6/66/SR.20, para. 48). A similar concern was expressed by the Netherlands, which stated that the "question of protection of the atmosphere seemed more suited for discussion among specialists" (A/C.6/66/SR.28, para. 64).

[8] Islamic Republic of Iran (A/C.6/66/SR.27, para. 52).

[9] United States of America (A/C.6/66/SR.20, para. 15). Similar remarks were made in 2012: United States (A/C.6/67/SR.19, para. 118), Netherlands (A/C.6/67/SR.19, para. 31), France (A/C.6/67/SR.19, para. 91), United Kingdom (A/C.6/67/SR.19, para. 68), China (A/C.6/67/SR.19, para. 52), and the Russian Federation (A/C.6/67/SR.22, para. 103).

(e) The Special Rapporteur's Reports would be based on this understanding.[10]

6. During the Sixth Committee's consideration of the Commission's report on the work of its sixty-fifth session, held in 2013, a number of delegates welcomed the inclusion of the topic,[11] while a few States expressed the same concerns as had been expressed in previous years.[12]

7. The Special Rapporteur has undertaken to establish contacts with representatives of interested intergovernmental organizations, including the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO) and the United Nations Economic Commission for Europe (ECE).[13]

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[10] It may be noted that the understanding relates only to "relevant political negotiations" and "the subjects of negotiations"; therefore, such discussion is not prevented in relation to subjects that are not part of the agenda of any ongoing treaty negotiations, although the Special Rapporteur did not intend, from the beginning, to interfere with political processes or to deal with specific substances. That the project will not "deal with, but is also without prejudice to" certain questions mentioned above does not preclude the Special Rapporteur from referring to them in the present study. The project is not intended to fill the gaps in treaty regimes but it will certainly identify such gaps. Furthermore, it should be noted that the understanding indicates no restriction on discussing any matters of customary international law relating to the subject by taking treaty practice into consideration either as State practice or *opinio juris*.

[11] Austria (A/C.6/68/SR.17, para. 73), Singapore (A/C.6/68/SR.17, para. 78), Portugal (A/C.6/68/SR.17, para. 86), Peru (A/C.6/68/SR.18, para. 27), Czech Republic (A/C.6/68/SR.18, para. 102), Romania (A/C.6/68/SR.18, para. 116), and Indonesia (A/C.6/68/SR.19, para. 69), as well as Cuba (on behalf of the Community of Latin American and Caribbean States), India, Italy, Malaysia, Slovenia, Spain and Thailand. Austria suggested a "redefinition" of the understanding, stating that "it will be unavoidable to address in this context also some of the issues currently excluded from the mandate, such as liability or the precautionary principle". Japan stated that the "protection of atmospheric environment requires coordinated action by the international community", expressing hope that "the topic will be deliberated in the Commission in a constructive way.

[12] United States (A/C.6/68/SR.17, para. 50), Russian Federation (A/C.6/68/SR.19, para. 55), China (A/C.6/68/SR.19, para. 60), United Kingdom of Great Britain and Northern Ireland, Islamic Republic of Iran and France. France pointed out that the limits imposed on the scope of the work seem to be "wise precautions" (A/C.6/68/SR.17, para. 106).

[13] A two-day workshop, organized by the Division of Environmental Law and Conventions of the United Nations Environment Programme (UNEP), was held for his benefit at UNEP headquarters in Nairobi on 17 and 18 January 2011 on the topic "Protection of the atmosphere". The Special Rapporteur wishes to express his deep appreciation to Mr. Masaharu Nagai, Acting Deputy Director of the Division, for organizing the workshop. A similar workshop was organized on the topic at the International Environment House in Geneva on 15 July 2011, and was attended by experts from Geneva-based international environmental organizations, such as the UNEP Regional Office for Europe, the World Meteorological Organization and the Economic Commission for Europe (ECE). The Special Rapporteur wishes to thank the organizer of the workshop, Ms Barbara Ruis of the UNEP Regional Office for Europe. Finally, a workshop on the topic was held in New York on 26 October 2011 at the Permanent Mission of Japan to the United Nations, jointly organized by UNEP and the Government of Japan. The Special Rapporteur wishes to express his deep gratitude to Mr. Tsuneo Nishida for hosting the workshop and to Mr. Chusei Yamada (former member of the International Law Commission) for acting as moderator, as well as to the following for their contributions as speakers: Mr. Donald McRae (University of Ottawa School of Law and member of the International Law Commission); Richard Stewart (New York University School of Law); and Mr. Masaharu Nagai (UNEP).

B. Purpose of the present report

8. The present report aims to address the general objective of the project in order to ascertain the rationale for work on the progressive development and codification of international law on the topic; and address the general scope of the topic in order to properly circumscribe it. The report is not, however, merely an exploratory study. It will attempt to identify the basic concepts, perspectives and approaches to be taken in connection with the subject. The purpose of the report is to outline the questions the Commission must consider from the outset with respect to the protection of the atmosphere and the corresponding legal problems to which they give rise, while simultaneously providing the basis for a common understanding of the basic concepts, objectives and scope of the project. It is hoped that the report will stimulate discussion within the Commission in order to provide the Special Rapporteur with the requisite guidance as to the approach to be followed and the goal to be achieved.

9. The present report first describes the rationale for the topic and basic approaches. It then traces the historical evolution of protection of the atmosphere in international law. It refers to the sources relevant to the progressive development and codification of the law on the topic and provides relevant information on the physical characteristics of the atmosphere, which will serve as a basis for defining the atmosphere in legal terms. It also provides a broad outline of the various elements comprising the general scope of the project, with a view to identifying the main legal questions to be covered. Lastly, the report discusses the question of the legal status of the atmosphere as a prerequisite for the Commission's consideration of the topic. The Special Rapporteur advances tentative conclusions on these preliminary questions in the form of draft guidelines.

C. Rationale for the topic and basic approaches

1. Rationale

10. While the draft articles of the Commission on the law of non-navigational uses of international watercourses[14] and the law of transboundary aquifers (see A/68/10, paras. 53 and 54) contain some provisions relevant to the protection of the environment, the Commission had not dealt with any topic in the field of international environmental law since concluding its work on international liability for injurious consequences arising out of acts not prohibited by international law, namely, Prevention of Transboundary Harm from Hazardous Activities (see A/56/10 and Corr.1, para. 94) and the draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (see A/61/10, paras. 66 and 67). This appeared to be a significant oversight at a time when the world was undergoing serious environmental degradation.[15]

11. It may be recalled that the Commission had specified in 1997 and 1998 that, in selecting a new topic, it should be guided by the following criteria in particular: the

[14] Adopted as the Convention on the Law of the Non-navigational Uses of International Watercourses (General Assembly resolution 51/229, annex).

[15] It was therefore welcomed that the Commission decided in 2013 to adopt two environmental topics: "Protection of the atmosphere" and "Protection of the environment in relation to armed conflicts" (with Marie G. Jacobsson as the Special Rapporteur). See A/68/10, para. 167.

topic should reflect the needs of States with respect to the progressive development and codification of international law; the topic should be at a sufficiently advanced stage in terms of State practice to permit progressive development and codification; and the topic should be settled and feasible enough for progressive development and codification.[16] It should be stressed that the Commission further agreed that it should not restrict itself to "traditional topics", and could also consider those that reflect "new developments in international law and pressing concerns of the international community as a whole".[17] The topic of protection of the atmosphere clearly satisfies those tests. First, the deteriorating state of the atmosphere has made its protection a pressing concern for today's international community. Second, there is abundant evidence of State practice including judicial precedents, treaties and other normative documents. Third, it is essentially a legal question rather than a political issue. For those reasons, the Commission and the Sixth Committee approved taking on the proposed topic.

12. As indicated in paragraphs 84 and 85 below, the atmosphere (air mass) is the planet's largest single natural resource; it is indispensable to the survival of humankind. Degradation of the conditions of the atmosphere has long been a matter of serious concern to the international community.[18] While a number of relevant

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[16] *Yearbook of the International Law Commission, 1997*, vol. II, Part II (United Nations publication, Sales No. E.99.V.6 (Part II), para. 238; ibid., *1998*, vol. II, Part II (United Nations publication, Sales No. E.00.V.11 (Part II), para. 553. In the same vein, three criteria have been suggested for topic selection: practical concern, namely, whether there is any pressing need for the topic in the international community as a whole; technical feasibility, namely, whether the topic is "ripe" enough in the light of relevant State practice and literature; and political feasibility, namely, whether dealing with the proposed topic is likely to receive broad support from States. See B. G. Ramcharan, *The International Law Commission: Its Approach to the Codification and Progressive Development of International Law* (The Hague, Nijhoff, 1977), pp. 60-63; Shinya Murase, *Kokusai Rippo: Kokusaiho no Hogenron* (International Lawmaking: Sources of International Law (Toshindo, 2002), pp. 217-221. A Chinese translation by Yihe Qin has also been published by the Chinese People's Public Security University Press, Beijing, 2012, pp. 104-123.

[17] *Yearbook of the International Law Commission, 1997*, vol. II, Part II, para. 238. Rohan Perera, a member of the Commission during the quinquennium of 2006-2011, noted "over time, the International Law of Co-existence evolved into an International Law of Co-operation, positive in character, to meet the needs and aspirations of the new global community and the accompanying challenges", and in "the final analysis, the ability of the Commission to effectively address these complex and challenging issues in formulating the new legal framework for contemporary international relations ... will ensure the continuing relevance and the central role of the International Law Commission" (see A. Rohan Perera, "Role of international law in meeting challenges to contemporary international relations: contribution of the International Law Commission (ILC)", in *Challenges of Contemporary International Law and International Relations: Liber Amicorum in Honour of Ernest Petrič*, Miha Pogačnik, ed. (Nova Gorica, Slovenia, Evropska Pravna Fakuleteta, 2011), pp. 315 and 325).

[18] See, for example, Alexandre Kiss and Dinah Shelton, *International Environmental Law*, 3rd ed. (Ardsley, New York, Transnational Publishers, 2004), pp. 555-592. See also Philippe Sands, *Principles of International Environmental Law*, 2nd ed. (Cambridge: Cambridge University Press, 2003), pp. 317-390; and Jacqueline Peel and Philippe Sands, *Principles of International Environmental Law*, 3rd ed. (Cambridge, Cambridge University Press, 2012), pp. 238-298; Patricia W. Birnie, Alan E. Boyle and Catherine Redgwell, *International Law and the Environment*, 3rd ed. (Oxford, Oxford University Press, 2009), pp. 335-378; David Hunter, James Salzman and Durwood Zaelke, *International Environmental Law and Policy*, 3rd ed. (New York, Foundation Press, 2007), pp. 538-733; Xue Hanqin, *Transboundary Damage in International Law* (Cambridge, Cambridge University Press, 2003), pp. 200-203.

conventions dealing with transnational and global atmospheric issues have been concluded, they remain a patchwork of instrumer s. Substantial gaps exist in terms of geographical coverage, regulated activities, regulated substances and, most importantly, applicable principles and rules. Such a piecemeal or incremental approach has created particular limitations for the protection of the atmosphere, which by its very nature warrants holistic treatment. There is no legal framework at present that covers the entire range of atmospheric environmental problems in a comprehensive and systematic manner. The Commission can therefore make a significant contribution by identifying the legal principles and rules applicable to the whole range of atmospheric problems on the basis of State practice and jurisprudence.

13. The goal to be achieved by the proposed project of progressive development and codification of international law is fourfold. First, the project aims to identify the status of customary international law, established or emerging, examining the gaps and overlaps, if any, in existing law relating to the atmosphere. Second, it aims to provide appropriate guidelines for harmonization and coordination among treaty regimes within and outside international environmental law. The issue of trade and the environment will prove to be a challenge in that area.[19] Third, the proposed draft guidelines will help to clarify a framework for the harmonization of national laws and regulations with international rules, standards and recommended practices and procedures relating to the protection of the atmosphere. Fourth, the project aims to establish guidelines on the mechanisms and procedures for cooperation among States in order to facilitate capacity-building in the field of transboundary and global protection of the atmosphere. It must be stressed that the purpose of this project is not to mould "shame and blame" matrices for potential polluters but that, on the contrary, it is primarily to explore possible mechanisms of international cooperation to solve the problems of common concern.

14. Last, as a word of reminder, it should be noted that the project does not duplicate the previous work of the Commission. The Commission adopted the draft articles on prevention of transboundary harm in 2001 (see A/56/10 and Corr.1, para. 94) and the draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities in 2006 (see A/61/10, paras. 66 and 67). Both drafts contain important provisions potentially applicable to atmospheric damage. However, their scope of application is, on the one hand, too broad (as they are intended to cover all types of environmental harm) and, on the other hand, too limited (as they focus on questions related to the prevention and allocation of loss caused by transboundary harm and hazardous activities). As such, they do not adequately address the protection of the atmosphere. Therefore, it is proposed that the Commission tackle the problem in a comprehensive and systematic manner. The prior work of the Commission should be referred to as important guidelines, where appropriate.

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[19] See Shinya Murase, "Perspectives from international economic law on transnational environmental issues", *Recueil des cours de l'Académie de droit international de La Haye*, vol. 253 (1995), pp. 283-431; see also Shinya Murase, *International Law: An Integrative Perspective on Transboundary Issues* (Sophia University Press, 2011), pp. 1-127; and Shinya Murase, "Conflict of international regimes: trade and the environment", in *Protection of the Environment for the New Millennium*, Kalliopi Koufa, ed. (Thessaloniki, Institute of International Public Law and International Relations, 2002).

2. Approaches

(a) Adhering exclusively to a legal approach

15. Needless to say, the Commission, charged with the work of the progressive development and codification of international law, will adhere exclusively to a legal approach in dealing with the topic. It will attempt to avoid the impassioned political and policy debate associated with certain environmental topics by addressing only the legal principles and rules pertaining to the protection of the atmosphere, as a Commission composed of legal experts. In the work of the Commission, it is critical to distinguish arguments based on *lex lata* (law as it is) from those based on *lex ferenda* (law as it ought to be). In the field of international environmental law, *lex ferenda* proposals and preferences are sometimes smuggled into the process of "interpretation" of *lex lata*, which should be avoided. Thus, the Commission will adopt a cautious approach to elaborating the draft guidelines on the protection of the atmosphere. First, it should seek to clarify the meaning and function of the existing legal principles in their interpretation and application *de lege lata*. Next, should existing law be found lacking, it could explore a reinterpretation of the existing legal concepts, principles and rules. Finally, it may, after careful analysis of the possibilities and boundaries of existing principles, add certain clarifications with regard to the progressive development of emergent rules of international law.

16. Naturally, all issues in international law, including the present topic, have both legal and political aspects. It is important, however, for the Commission to focus on the legal aspects of the issue. It is hoped that clarifying the key concepts from a legal perspective will enable a more disciplined analysis of their legal status, meanings, functions, implications, possibilities and limits within the existing legal regimes and set the stage for a more constructive elaboration and progressive development of international law in the future. The work of the Commission will take the various legal frameworks that have heretofore been set up to handle only discrete and specific atmospheric problems and rationalize them into a single, flexible set of guidelines. As agreed at the time of taking up the present topic, the work of the Commission will proceed in a manner so as not to interfere with relevant political negotiations (see para. 5 above).

(b) Referring to general international law

17. It is important for the Commission to consider the legal principles and rules on the subject within the framework of general international law. Obviously, the fundamental issues to be studied by the Commission involve such questions as the basic rights and obligations of States, the jurisdiction of States, the implementation of international obligations through the domestic law of States, the responsibility of States and the settlement of disputes, as well as the sources of international law — classic issues for international lawyers in general and for the Commission in particular. In that regard, the Commission should resist the tendency towards "compartmentalization (or fragmentation)" caused by dominant "single-issue"

approaches to international environmental law.[20] In other words, the legal principles and rules applicable to the atmosphere should, as far as possible, be considered in relation to the doctrine and jurisprudence of general international law.[21] It also implies that the work of the Commission should extend to applying the principles and rules of general international law to various aspects of the problem of atmospheric protection. The Commission must look to new topics in international law for progressive development and codification in specialized fields such as human rights, environmental protection, and trade and investment since most of the significant "traditional" topics in international law have been exhausted. It is true to some extent that the development of those areas of law would be better carried out by specialized lawmaking bodies and experts with specialized knowledge. However, this would serve to further compartmentalize international law. It is absolutely

[20] Murase, *International Law* (see footnote 19 above), p. 10. Martti Koskenniemi, a former member of the Commission, challenges the very raison d'être of the International Law Commission by stating as follows: "Old law-making bodies, such as the United Nation's International Law Commission, find themselves increasingly jobless. Unable to identify stakeholder interests or regulatory objectives, 'generalist' law-making bodies will wither away to the extent that political commitment to that which is merely general seems pointless. If human rights interests can best be advanced in human rights bodies, environmental interests in environmental bodies and trade interests in trade bodies, while transnational activities create de facto practices that are as good (or even better) than formal law in regulatory efficiency, why bother with 'the progressive development and codification of international law' (Statute of the International Law Commission, article 1) beyond tinkering with diplomatic immunities or technical treaty law?" Martti Koskenniemi, "International law and hegemony: a reconfiguration", *Cambridge Review of International Affairs*, vol. 17, No. 2 (2004), pp. 197-218. See also Koskenniemi, article reprinted in *The Politics of International Law* (Oxford, Hart Publishing, 2011), p. 237. It seems, however, that Koskenniemi's assertion contradicts the general conclusion of the Study Group on the Fragmentation of International Law (A/CN/L.682 and Corr.1), which he chaired. (See also *The Work of the International Law Commission*, 8th ed., vol. II (United Nations publication, Sales No. E.12.V.2), pp. 231-234 and pp. 430-444.) Naturally, human rights bodies will be able to advance human rights interests more efficiently than other bodies; the situation is similar with environmental bodies and environmental interests, and trade bodies and trade interests. However, leaving lawmaking to specialist bodies results in a fragmentation of international law in an international society where there is neither a supreme legislature nor constitutional courts to ensure coordination among conflicting interests.

[21] For example, the use of the concept of "equity" in the context of climate change — often ambiguous and arbitrary — clearly demonstrates the need to refer to the jurisprudence of the International Court of Justice, including the 1985 Chamber judgment of the Court in the *Frontier Dispute* case between Burkina Faso and Mali (*Frontier Dispute, Judgment, I.C.J Reports 1986*, p. 554) in which the Court indicated that there were three categories of equity in international law: equity infra legem (within the law), equity *praeter legem* (outside, but close to, the law) and equity *contra legem* (contrary to law). The notion of equity *praeter legem* is particularly important for its function in filling gaps in existing law. See in general Prosper Weil, "L'équité dans la jurisprudence de la Cour Internationale de Justice: un mystère en voie de dissipation?", in *Fifty Years of the International Court of Justice: Essays in Honour of Sir Robert Jennings*, Vaughan Lowe and Malgosia Fitzmaurice, eds. (Cambridge, Cambridge University Press, 1996), pp. 121-144; Juliane Kokott, "Equity in international law", in *Fair Weather? Equity Concerns in Climate Change*, F. L. Toth, ed. (London, Earthscan, 1999), pp. 186-188; Dinah Shelton, "Equity" in *Oxford Handbook of International Environmental Law*, Daniel Bodansky, Jutta Brunnée and Ellen Hey, eds. (Oxford, Oxford University Press, 2007), pp. 653-658. See also Japan Branch Committee on Climate Change, "Legal principles relating to climate change: preliminary issues on the methodology and scope of the work", *Japanese Yearbook of International Law*, vol. 52 (2009), pp. 500-537.

necessary, therefore, to place each isolated compartment within the framework of general international law in order to establish coherent links among them. The "generalist" or "integrative" approach, which cuts across the boundaries of special regimes, is thus indispensable to today's lawmaking activities and efforts to codify and progressively develop international law by the Commission are more important than ever before.

18. Given that the Commission is a body that primarily comprises experts in general international law, some may see it as ill-suited to accommodate new specialized sub-fields of international law. On the contrary, the Special Rapporteur sees new possibilities and new opportunities for the Commission in the twenty-first century. The enormous growth in the number of treaties in such specialized fields has led to "treaty congestion" or "treaty inflation".[22] The multitude of conventions notwithstanding, they are faced with significant gaps as well as overlaps because there has been little or no coordination or harmonization and, therefore, no coherence among them. The need to enhance synergies among the existing conventions has been emphasized repeatedly;[23] the Commission should seize upon this opportunity. In its exercise of progressive development and codification of international law, the Commission should deal with these proposed new topics in specialized fields from the perspective of general international law, with a view to ensuring coordination among the various sub-fields (compartments) of international law. The Commission is best placed to play that role.

(c) Consulting scientific institutions and experts

19. Taking on a subject such as the protection of the atmosphere requires the Commission to have a certain level of understanding of the scientific and technical aspects of the problem, such as the sources and effects of the damage in question. It is therefore necessary for the Commission to reach out to international environmental organizations and to the scientific community. Its Statute authorizes the Commission in article 16 (e) to "consult with scientific institutions and individual experts" for the progressive development of international law. There are also comparable precedents: Mr. Chusei Yamada, as Special Rapporteur for the law

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[22] See Edith Brown Weiss, "International environmental law: contemporary issues and the emergence of a new world order", *Georgetown Law Journal*, vol. 81 (1993), at pp. 697-702; Shinya Murase, "Compliance with international standards: environmental case studies", in *Proceedings of the 89th Annual Meeting of the American Society of International Law: Structures of World Order* (Washington, D.C., American Society of International Law, 1995), pp. 206-224; Donald K. Anton, "Treaty congestion in contemporary international environmental law", in *Routledge Handbook of International Environmental Law*, Shawkat Alam and others, eds. (New York, Routledge, 2013), pp. 651-665.

[23] UNEP has been emphasizing the need for synergy among multilateral environmental agreements: see the appendix to decision SS.VII/1 on international environmental governance of 15 February 2002 of the seventh special session of the Governing Council entitled report of the Open-ended Intergovernmental Group of Ministers or Their Representatives on International Environmental Governance", section III.C entitled "Improved coordination among and effectiveness of multilateral environmental agreements", in particular paragraph 27 (see A/57/25, annex I). The UNEP Governing Council has adopted similar decisions almost every year. The latest is the Nusa Dua Declaration of 26 February 2010 (A/65/25, annex I, decision SS.XI/9) (see paras. 10-12). See also Philippe Roch and Franz Xaver Perrez, "International environmental governance: the strive towards a comprehensive, coherent, effective and efficient international environmental regime", *Colorado Journal of International Environmental Law and Policy*, vol. 16 (2005), pp. 1-25.

of transboundary aquifers, engaged United Nations Educational, Scientific and Cultural Organization experts on the hydrology of aquifers for successful completion of the draft articles on the subject. As the author of the present report indicated above, steps have been taken to reach out to the relevant international organizations as well as the scientific/technical community for their advice and expertise in helping the Commission to understand what has to be regulated. The situation is similar to the one faced by contemporary judges of international courts and tribunals, who, confronted with an increasing number of environmental disputes being filed in their dockets, require experts for proof of scientific evidence in those fact-intensive cases.[24]

II. Background

A. Evolution of international law on the protection of the atmosphere

20. The gaseous content of the atmosphere (*aër* in Greek and Latin) has been categorized as one of the legal commons since Roman times — as proclaimed in the sixth century in a famous passage in the Institutes of Emperor Justinian (II.1.1: classification of things, *de rerumdivisione*): "By the law of nature, things can be everybody's: these things which are naturally common to all are *the air*, flowing water, the sea and the seashores" (emphasis added).[25]

21. Sharia law, which was systematized in the early years of the Muslim era (the eighth and ninth centuries), places importance on "the air" as the element indispensable "for the perpetuation and preservation of life". An authoritative study states that "This element is no less important than water" and "Since the atmosphere performs all these biological and social functions, its conservation, pure and unpolluted, is an essential aspect of the conservation of life itself which is one of the fundamental objectives of Islamic law".[26]

22. For many centuries, oceans were at the centre of modern international law. Meanwhile, neither the atmosphere nor the air were considered objects to be regulated by international law until the twentieth century.[27] Lawyers first started looking to the sky in 1783 when a hot air balloon was launched by the Montgolfier brothers with the authorization of the French police. The authorization, containing clearly defined conditions to be observed, demonstrated the power of the State to

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[24] Most notably, see the *Pulp Mills on the River Uruguay (Argentina v. Uruguay) (Judgment, I.C.J. Reports 2010)*, p. 14, paras. 160-168 (on the burden of proof and expert evidence), and the joint dissenting opinion of Judges Al-Khasawneh and Simma (ibid., p.108), paras. 1-6.

[25] *Justinian's Institutes*, translated with an introduction by Peter Birks and Grant McLeod; with the Latin text of Paul Krueger (Ithaca, New York, Cornell University Press, 1987); see Peter H. Sand, "Shared responsibility for transboundary air pollution", in *The Practice of Shared Responsibility*, vol. 2, André Nollkaemper, ed. (Cambridge, Cambridge University Press, forthcoming).

[26] Abubakr Ahmed Bagader and others, *Environmental Protection in Islam*, 2nd ed., (IUCN Environmental Policy and Law Paper, No. 20 Rev. (Gland, Switzerland, World Conservation Union, 1994), pp. 7-8. The Special Rapporteur wishes to express his gratitude to the author of the study, Wolfgang E. Burhenne.

[27] At the local level, legislative action in the face of atmospheric pollution dates back to at least 1273, when an ordinance aimed at the prohibition of coal burning in London was issued (see Ian H. Rowlands, "Atmosphere and outer space", in *The Oxford Handbook*, see footnote 21 above, p. 317).

regulate activities in what is now called airspace.[28] Development of the notion of airspace since then is well known.[29] However, most international lawyers did not attempt to look at the substances in the atmosphere or the role of the atmosphere in transporting pollutants even into the 1950s.[30] For a long time, the differentiation between airspace and atmosphere was not made clear among international lawyers, and it was generally considered that the highest altitude of an aircraft was the upper limit of airspace. For example, by interpreting the French text "espace aérien" in article 1 of the Convention on International Civil Aviation (1944),[31] it was asserted that airspace reached as far as the atmosphere could be found. However, earlier in the twentieth century, a United States domestic court was faced with the air pollution case described below, which was later to have a significant impact on international law.

23. One of the earliest air-pollution cases to be considered in a domestic court was the United States Supreme Court case of the *State of Georgia, Complainant, v. the Tennessee Copper Company and the Ducktown Sulphur, Copper and Iron Company, Ltd*[32] in 1907 and 1915. The dispute concerned two copper mining companies located in the State of Tennessee that conducted mining and smelting operations near the border of the State of Georgia. The companies emitted large quantities of sulphur dioxide, which produced sulphuric acid in the atmosphere. Georgia brought an original action in the United States Supreme Court to restrain the two companies from discharging the noxious gas from their works. They alleged that the emissions, carried by the wind, resulted in a wholesale destruction of forests, orchards and crops in Georgia. The Supreme Court found that it was a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great

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[28] In the period 1870-1871 during the Franco-Prussian war, balloons were used on both sides, especially during the siege of Paris. Based on the experience of the war, the First Hague Peace Conference in 1899 adopted a multilateral convention to regulate the use of balloons during armed conflicts (see Peter H. Sand, Geoffrey N. Pratt and James T. Lyon, *An Historical Survey of the Law of Flight* (Montreal McGill University Institute of Air and Space Law, 1961), p. 9; Wybo P. Heere, "Problems of jurisdiction in air and outer space", in *Reflections on Principles and Practice of International Law: Essays in Honour of Leo J. Bouchez*, T. Gill and W. Heere, eds. (Boston, Martinus Nijhoff, 2000), p. 65 ff.

[29] At the turn of the twentieth century, Paul Fauchille was the leading advocate of freedom of the air. The gist of his arguments was that real property of the air was impossible because no one could appropriate it and that the same applied to the possibility of the State to "dominate" the air. The result was that airspace was a *res communis omnium*, and therefore free. For reasons of security, however, he proposed a safety zone for the first 1,500 metres above ground. Paul Fauchille, "Le domaine aérien et le régime juridique des aérostats", *Revue générale de droit international public*, vol. 8 (1901), p. 414 ff. The Convention Relating to the Regulation of Aerial Navigation, signed at Paris on 13 October 1919 recognized the complete and exclusive sovereignty over the airspace above the State territory (see Nicolas Mateesco Matte, *Traité de Droit Aérien-Aéronautique*, 2nd ed. (Paris, Pedone, 1964), p. 95 ff.

[30] See, for example, John Hogan, "Legal terminology for the upper regions of the atmosphere and for the space beyond the atmosphere", *American Journal of International Law*, vol. 51 (1957), pp. 362-375.

[31] Signed at Chicago on 7 December 1944 (United Nations, *Treaty Series*, vol. 15, No. 102), entered into force in 1947; see Bin Cheng, "Air law", in *Encyclopedia of Public International Law*, vol. 1, Rudolf Bernhardt, ed. (Amsterdam; New York, North-Holland, 1992), pp. 66-72; Bin Cheng, *The Law of International Air Transport* (London, Stevens and Sons, 1962), pp. 120 and 121.

[32] United States Supreme Court, 13 May 1907, 10 May 1915, 237 U.S. 474, 477; reproduced in Cairo A. R. Robb, ed., *International Environmental Law Reports*, vol. 1, Early Decisions (Cambridge, Cambridge University Press, 1999), pp. 514-523.

scale.[33] By 1914, Georgia and the Tennessee Copper Company had come to an agreement, whereby the latter undertook to contribute to a fund to compensate those injured by the fumes from its works, to allow inspections of its plant and to not operate more green ore furnaces than it found necessary. However, no agreement was reached with the Ducktown Company, and a second opinion of the Supreme Court was therefore rendered on 10 May 1915. The Court, while ultimately ruling in favour of Georgia's injunction request, found that it was impossible to ascertain the necessary reduction in sulphur content to Ducktown Company's emissions to prevent injury to the State. The Court imposed certain conditions on the Ducktown Company related to record keeping, inspection and limiting emission levels.

24. The case was indeed a precursor to the famous *Trail Smelter* case[34] between the United States and Canada (then a Dominion of the United Kingdom) in the 1930s. The *Trail Smelter* case remains the leading case of transboundary air pollution in international law today, affirming the customary principle of "good neighbourliness" in bilateral arrangements between neighbouring countries. Its final judgement in 1941, which cited at length the decision in the Georgia v. Tennessee case,[35] demonstrated that some of the most basic principles in international law are derived from domestic court decisions. The *Trail Smelter* case is representative of the traditional type of international environmental dispute in two ways: the causes and effects of the environmental damage are identifiable, and a territorial State is under an obligation to exercise due diligence over the activities of individuals and companies within its territory in order to ensure that the activities do not cause harm to other States and their nationals. That principle of prevention (or "preventive principle") was later confirmed as principle 21 of the Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) in 1972. Transboundary air pollution caused by industrial accidents has become serious and large scale since the 1970s, as seen in the catastrophic accidents at Seveso, Italy (1976), and Bhopal, India (1984).[36] The Convention on the Transboundary Effects of Industrial Accidents (1992)[37] was designed to protect humans and the environment from the consequences of industrial accidents through preventive measures and, should accidents occur, to implement efforts to reduce their severity and mitigate their impacts.

25. The 1960s saw not only the repetition of traditional transboundary environmental problems but also the appearance of new challenges in international environmental law. The challenges came from two perspectives. One challenge was the broadening of environmental damage both in terms of its causes and effects, as in the case of acid rain, which made it difficult to identify distinct point-sources of pollution as well as specifically affected locations. The cumulative nature of the damage makes it particularly difficult to allocate blame. The 1979 Convention on Long-range Transboundary Air Pollution was concluded within a regional framework

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[33] Ibid.

[34] *Trail Smelter* case (United States of America v. Canada) (Final Award of 1941), United Nations, *Reports of International Arbitral Awards*, vol. III (United Nations publication, Sales No. 1949.V.2), p. 1907 ff.

[35] Ibid., p. 1965.

[36] Murase, *International Law* (see footnote 19 above), pp. 74-96.

[37] Adopted at Helsinki on 17 March 1992 (United Nations, *Treaty Series*, vol. 2105, No. 36605), entered into force in 2000.

in response to such problems.[38] The other challenge was the rapid development of so-called "ultra-hazardous activities", such as the operation of oil tankers, aircrafts, nuclear power plants and space objects. While those activities are generally beneficial for the welfare of people, they carry the potential for tremendous damage to human life in the event of accidents, and accidents have occurred. It was therefore necessary to establish a special regime of liability in the relevant conventions.[39]

26. Since the 1980s, the world has witnessed the rapid deterioration of the global environment in the form of ozone depletion and climate change. The initial response by the international legal community comprised the 1985 Vienna Convention for the Protection of the Ozone Layer[40] and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.[41] The 1992 United Nations Framework Convention on Climate Change[42] and the 1997 Kyoto Protocol to the Convention[43] were later concluded to meet the challenge of climate change. In response to these global issues, international law has developed a number of new techniques to cope with the scientific uncertainty associated with environmental problems, including the adoption of precautionary approaches; a combination of framework conventions and protocols; and unique non-compliance procedures and flexible mechanisms.[44]

27. It may be noted that in the late 1980s there were certain significant movements promoting the idea of a "law of the atmosphere" aimed at the adoption of a comprehensive approach to combating atmospheric problems.[45] Chapter 9 of Agenda 21

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[38] Adopted at Geneva on 13 November 1979 (United Nations, *Treaty Series*, vol. 1302, No. 21623), entered into force in 1983; see Peter H. Sand, "Regional approaches to transboundary air pollution", in *Energy Production, Consumption, and Consequences*, John L. Helm, ed. (Washington, D.C., National Academy Press, 1990), pp. 246-264.

[39] See, for example, L. F. E. Goldie, "Liability for damage and the progressive development of international law", *International and Comparative Law Quarterly*, vol. 14 (1965), p. 122 ff; C. W. Jenks, "Liability for ultra-hazardous activities in international law", *Collected Courses of The Hague Academy of International Law — Recueil des cours*, vol. 117 (1966), p. 111 ff; P. M. Dupuy, *La responsabilité internationale des États pour les dommages d'origine technologique et industrielle* (Paris, Pedone, 1976).

[40] Adopted at Vienna on 22 March 1985 (United Nations, *Treaty Series*, vol. 1513, No. 26164), entered into force in 1988.

[41] Adopted at Montreal on 16 September 1987 (United Nations, *Treaty Series*, vol. 1522, No. 26369), entered into force in 1989.

[42] Adopted at New York on 9 May 1992 (United Nations, *Treaty Series*, vol. 1771, No. 30822), entered into force in 1994.

[43] Adopted at Kyoto on 11 December 1997 (United Nations, *Treaty Series*, vol. 2237, No. 30822), entered into force in 2005.

[44] Murase, *International Law* (see footnote 19 above), pp. 24-30.

[45] For the 1988 and 1989 conferences organized by the Government of Canada, see, "International Conference on the Changing Atmosphere: implications for global security, Conference statement, Toronto, 27-30 June 1988", *Environmental Policy and Law*, vol. 18 (1988), p. 155; "Protection of the atmosphere: statement of the International Meeting of Legal and Policy Experts, Ottawa, February 22, 1989", *American University Journal of International Law and Policy*, vol. 5 (1990), pp. 529-542; Jim Bruce, "Law of the Air: A Conceptual Outline", *Environmental Policy and Law*, vol. 18, 1988, p. 5; Peter H. Sand, "UNCED and the Development of International Environmental Law", *Yearbook of International Environmental Law*, vol. 3, No. 1 (1992), pp. 3-17; See also M. S. Soroos, *The Endangered Atmosphere: Preserving a Global Commons* (Columbia, University of South Carolina Press, 1997). Donald McRae recalls that the topic of the protection of the atmosphere has had a link with the Commission since the late 1980s, remarking: In June 1988 Canada hosted a conference in Toronto on the Changing Atmosphere, which engaged scientists and officials from Governments,

addressed the "Protection of the atmosphere", and in ensuing years the Commission on Sustainable Development held substantive discussions on the subject at its ninth session, held in 2001 (see E/2001/29) and at its fifteenth, in 2007 (see E/2007/29), focusing on a cluster of thematic issues, including the atmosphere and air pollution. In paragraph 13, the 2002 Johannesburg Declaration on Sustainable Development stated that the global environment continued to suffer and that air, water and marine pollution continued to rob millions of a decent life. However, efforts to protect the atmosphere have not yet materialized into a hard-law instrument. Nonetheless, in recent years, there appears to be a revival of enthusiasm for a comprehensive multilateral convention on the atmosphere. For instance, the fifteenth World Clean Air Congress held in Vancouver, Canada, in September 2010 adopted its final declaration entitled "One atmosphere", which sought to encourage the integration of climate and pollution policies and called for a new "Law of the atmosphere", which would parallel the United Nations Convention on Law of the Sea.[46] It may be a little too ambitious to talk about the "Law of the atmosphere" just yet. It appears more realistic to consider a "Law on the protection of the atmosphere" with a relatively narrower focus. It is nonetheless encouraging to see that momentum appears to be mounting for a comprehensive consideration on the subject.

28. Finally, it may be worth pointing out that one of the outcomes of the workshop held in Gothenburg, Sweden, from 24 to 26 June 2013, on future international air pollution strategies, which was organized by the Swedish Environmental Protection Agency and the Swedish Environmental Research Institute, in close collaboration with the Convention on Long-range Transboundary Air Pollution and the European Commission, was a recommendation to call upon the expertise of the Commission in addressing atmospheric protection. Participants at the workshop stated that the Convention on Long-range Transboundary Air Pollution should invite the International Law Commission "to continue exploring the scope for a 'Law of the

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the United Nations and other intergovernmental and non-governmental organizations. That conference called on Governments to work with urgency toward an Action Plan for the Protection of the Atmosphere, which would include an international framework convention. The next year in February 1989 a meeting of legal and policy experts was held in Ottawa. The meeting endorsed the idea of a framework convention on the protection of the atmosphere and set out the elements that would be needed in such a framework convention. Of course, events moved on, climate change became a more major focus and while some of the ideas at that meeting of experts were incorporated into other conventions, no framework convention on the protection of the atmosphere was concluded. I mentioned that one could draw a link between the 1989 meeting and the International Law Commission. A leading participant in that meeting of legal and policy experts was Alan Beesley, the Canadian international lawyer and diplomat who had been a central figure in the Law of the Sea negotiations and played a role at Stockholm as well, and was at that time a member of the Commission. Beesley spoke at the opening of the meeting about the need for creative solutions to be adopted by lawyers and how lawyers had to take a lead in policy development in this field. And on the list of invitees were Julio Barboza, at that time a member of the Commission, and Vaclav Mikulka, Hanqin Xue and myself, all later to become members of the Commission. So, in some sense, Professor Murase's proposal that the Commission take up the topic of the "Protection of the Atmosphere" reaches back to a challenge of twenty years ago. And, if it was ripe as a topic then, it is certainly ripe today. (Donald McRae, paper presented at the workshop on the protection of the atmosphere held at the Permanent Mission of Japan to the United Nations in New York on 26 October 2011. The workshop was organized jointly by the Government of Japan and UNEP).

[46] Available from www.iuappa.com/newsletters/VancouverDeclaration.pdf. The World Clean Air Congress is organized by the International Union of Air Pollution Prevention and Environmental Protection Associations, which comprises non-governmental organizations from 40 States.

Atmosphere', which would facilitate integrated action on climate change and tropospheric air pollution".[47] The high expectations of the international community in respect of the Commission should be duly noted.

B. Sources

29. Several sources relevant to the protection of the atmosphere can be cited. The relevant multilateral conventions can be roughly classified into those of primarily regional application and those of universal application. In contrast to the number of multilateral conventions, bilateral conventions are few, evincing the essentially regional and global character of the majority of the problems relating to the atmosphere. Principles and rules of customary international law must be ascertained in light of *opinio juris* and the general practice of States. The jurisprudence of international courts and tribunals is no doubt an important source for determining the customary law status of the rules and principles relating to the protection of the atmosphere. Non-treaty instruments, domestic legislation and the jurisprudence of domestic courts are also important sources for ascertaining existing or emergent rules of customary law — the basis for the exercise of codification and progressive development.

1. Treaty practice

30. Following, is a list, which is not intended to be exhaustive, of binding multilateral and bilateral agreements relevant to atmospheric problems:

(a) Multilateral agreements relating to air pollution

- The 1979 Convention on Long-range Transboundary Air Pollution and the protocols thereto, including on Long-Term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (1984); on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent (1985) and on Further Reduction of Sulphur Emissions (1994); concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes (1988); concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes (1991); on Heavy Metals (1998); on Persistent Organic Pollutants (1998); and the multi-pollutant/multi-effects Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (1999) (Gothenburg Protocol), as amended on 4 May 2012
- ECE Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts — upon entry into force renamed Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts

[47] Peringe Grennfelt and others, eds., *Saltjöbaden V — Taking International Air Pollution Policies into the Future*, Gothenburg, 24-26 June 2013 (Copenhagen, Nordic Council of Ministers, 2013, p. 14, available from www.saltsjobaden5.ivl.se/download/18.372c2b801403903d275747b/1383119195373/Saltsjobaden+V.pdf. At its 32nd session, held from 9 to 13 December 2013, the Executive Body for the Convention on Long-range Transboundary Air Pollution took note of the recommendations of the "Saltsjobaden V" workshop (see ECE/EB.AIR/122). The 16th World Clean Air Congress, held in Cape Town, South Africa from 29 September to 4 October 2013, made a similar recommendation to the International Law Commission.

which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions (1958, 1994),[48] subsequently "globalized" by Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts, which can be fitted and/or used on Wheeled Vehicles (1998)[49]

- ECE Convention on Environmental Impact Assessment in a Transboundary Context (1991)[50]

- ECE Convention on the Transboundary Effects of Industrial Accidents (1992), with its Protocol on Civil Liability and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents on Transboundary Waters to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and to the 1992 Convention on the Transboundary Effects of Industrial Accidents (2003)[51]

- Council of the European Union directives on air pollution,[52] including in particular directive 2001/81/EC of the European Parliament and the Council of the European Union on national emission ceilings for certain atmospheric pollutants;[53] directive 2007/46/EC of the European Parliament and the Council of the European Union establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, with related annexes and technical regulations implementing/adapting the corresponding ECE agreements for wheeled vehicles;[54] directive 2008/50/EC of the European Parliament and of the Council of the European Union on ambient air quality and cleaner air for Europe;[55] and directive 2010/75/EU of the European Parliament and of the Council of the

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[48] Adopted at Geneva on 20 March 1958 (United Nations, *Treaty Series*, vol. 335, No. 4789, entered into force in 1959, title amended in 1994; implemented by a series of technical regulations dealing with pollutant emissions (especially Nos. 40, 41, 47, 49, 51 and 83).

[49] Adopted at Geneva on 25 June 1998 (United Nations, *Treaty Series*, vol. 2119, No. 36868), entered into force in 2000; implemented by a series of technical regulations including the measurement of carbon dioxide and other exhaust gases.

[50] Adopted at Espoo, Finland, on 25 February 1991 (United Nations, *Treaty Series*, vol. 1989, No. 34028), entered into force in 1997.

[51] The Civil Liability Protocol (adopted at Kiev on 21 May 2003) is not yet in force.

[52] For a current summary see Jan H. Jans and Hans B. Vedder, *European Environmental Law: After Lisbon*, 4th ed. (Groningen, Europa Law Publishing, 2012), pp. 419-430.

[53] *Official Journal of the European Union*, L 309, 27 November 2001, currently under review.

[54] Especially through regulation 715/2007 of the European Parliament and the Council of the European Union on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information (*Official Journal of the European Union*, L 171, 29 June 2007) (as amended by regulation 595/2009 of the European Parliament and the Council of the European Union on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information (*Official Journal of the European Union*, L 188, 18 July 2009), entered into force in 2013.

[55] *Official Journal of the European Union*, L 152, 11 June 2008, replacing (as from 11 June 2010) several earlier "substance-specific" directives on ambient air quality (for sulphur dioxide (1980); lead (1982); nitrogen dioxide (1985); ground-level ozone (1992); and volatile organic compounds (1999/2004)), and the related 1996 Framework Directive on Ambient Air Quality Assessment and Management (Official Journal of the European Communities, L 296, 21 November 1996).

European Union on industrial emissions (integrated pollution prevention and control)[56]

- Standards and Recommended Practices of the International Civil Aviation Organization (ICAO) for aircraft engine emissions: annex 16 (Environmental Protection) of the 1944 Convention on International Civil Aviation (1981/2008)[57]
- Protocol of 1997 (Annex VI — Regulations for the Prevention of Air Pollution from Ships) to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)[58]
- Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution (2002)[59]
- Stockholm Convention on Persistent Organic Pollutants (2004)[60]
- Framework Convention for the Protection of the Environment for Sustainable Development in Central Asia (2006)[61]
- Minamata Convention on Mercury (2013)[62]

(b) Bilateral agreements on transboundary air pollution

- Czech-Polish Treaty concerning Protection of the Atmosphere against Pollution (1974)[63]

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[56] *Official Journal of the European Union*, L 334, 17 December 2010. This directive will (as from 7 January 2016) replace directive 2001/80/EC of the European Parliament and of the Council of the European Union on the limitation of emissions of certain pollutants into the air from large combustion plants (*Official Journal of the European Union*, L 309, 27 November 2001, repealing an earlier 1988 directive), and directive 2000/76/EC of the European Parliament and of the Council of the European Union on the incineration of waste (*Official Journal of the European Communities*, L 332, 28 December 2000).

[57] United Nations, *Treaty Series*, vol. 15, No. 2; the first edition of annex 16, vol. II ("Aircraft engine emissions") was adopted on 30 June 1981 and entered into force in 1982, periodically amended by the International Civil Aviation Organization (ICAO) Council; See Peter H. Sand, *Lessons Learned in Global Environmental Governance* (Washington, D.C., World Resources Institute, 1990), pp. 18-20.

[58] Annex VI entered into force in 2005, periodically amended by the International Maritime Organization (IMO) Marine Environment Protection Committee.

[59] Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution, adopted at Kuala Lumpur on 10 June 2002.

[60] Adopted at Stockholm on 22 May 2001 (United Nations, *Treaty Series*, vol. 2256, No. 40214), entered into force in 2004.

[61] Not yet in force. Signatories are: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Article 8 deals with "air protection".

[62] Adopted at Minamata on 10 October 2013. Available from www.mercuryconvention.org.

[63] Adopted at Warsaw on 24 September 1974 as the Treaty between the Government of the Czechoslovak Socialist Republic and the Government of the Polish People's Republic concerning Protection of the Atmosphere against Pollution (United Nations, *Treaty Series*, vol. 971, No. 14068), entered into force in 1975; see Jerzy Sommer, "Transboundary cooperation between Poland and its neighbouring States", in *Transboundary Air Pollution: International Legal Aspects of the Cooperation of States*, Cees Flinterman, Barbara Kwiatkowska and Johan G. Lammers, eds. (Dordrecht, Martinus Nijhoff, 1986), pp. 205-233.

- Memorandum of Intent Between the Government of the United States of America and the Government of Canada Concerning Transboundary Air Pollution (1980)[64]
- Agreement Between Mexico and the United States of America on cooperation for the protection and improvement of the environment in the border area (1983), with two supplementary agreements (1987, 1989)[65]
- Agreement between the Government of Canada and the Government of the United States of America on Air Quality (1991)[66]
- Czech-German Agreements (1992, 1994, 2000 and 2004)[67]

(c) Multilateral conventions on global atmospheric problems

- Vienna Convention for the Protection of the Ozone Layer (1985), with its Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
- United Nations Framework Convention on Climate Change (1992), with its Kyoto Protocol (1997)

31. Some of the agreements are briefly highlighted below. They are no doubt important sources from which the Commission can draw inspiration when elaborating draft guidelines on the protection of the atmosphere.

32. **Convention on Long-range Transboundary Air Pollution (1979).**[68] The 1979 Convention on Long-range Transboundary Air Pollution was formulated under the auspices of ECE in the form of a framework agreement to address the major concerns about acid rain and other dispersed pollutants. According to article 1 (b) of the Convention, the term "long-range transboundary air pollution" is defined as pollution having effects at such a distance that "it is not generally possible to distinguish the contributions of individual emission sources or groups of sources". While the Convention did not stipulate specific limits on emissions of industrial pollutants, it did establish a regime for continued consideration of the issue. It has been noted that, "[d]espite its evident weaknesses, the Geneva Convention's real value is that it has provided a successful framework for cooperation and the development of further measures of pollution control".[69] A series of eight separate protocols have subsequently been negotiated and agreed upon.

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[64] Adopted 5 August 1980.

[65] Adopted 14 August 1983 (United Nations, *Treaty Series*, vol. 1352, No. 22805).

[66] Adopted 13 March 1991 (United Nations, *Treaty Series*, vol. 1852, No. 31532).

[67] The 1994 Agreement provides for implementation of joint environmental pilot projects for flue gas cleaning in coal-fired power plants; the 2000 and 2004 Agreements provide for joint implementation of a "Clean Air Fund" and other pilot projects in the Czech Republic, aimed at reducing transboundary air pollution impacts in Germany; the 2004 Agreement specifically refers to "joint implementation" under the Kyoto Protocol of the United Nations Framework Convention on Climate Change.

[68] See Johan Sliggers and Willem Kakebeeke, eds., *Clearing the Air: 25 years of the Convention on Long-range Transboundary Air Pollution* (United Nations publication, Sales No. E.04.II.E.20); Rolf Lidskog and Göran Sundqvist, eds., *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction* (Cambridge, Massachusetts, MIT Press, 2011).

[69] Birnie, Boyle and Redgwell, *International Law and the Environment* (see footnote 18 above), p. 345.

33. **Protocols to the 1979 Convention on Long-range Transboundary Air Pollution**. The protocols reveal significant innovations in rule-making. The first Sulphur Protocol (1985) required parties to reduce their sulphur emissions or transboundary fluxes by at least 30 per cent by 1993, applying a single flat rate to all parties. In contrast, the second Sulphur Protocol (1994) applied the "critical loads" concept to set differentiated emissions targets for each party. Targets ranged from an 80 per cent reduction for Germany to a 49 per cent increase for Greece, for an overall collective emissions reduction of 50.8 per cent. While the first Sulphur Protocol's emissions reduction target of 30 per cent was arrived at essentially arbitrarily, the differentiated national targets of the second Sulphur Protocol were reached using the critical loads approach, together with cost efficiency, reflecting a high degree of scientific and technical knowledge.[70] The resulting commitments are fairer to all parties, given that they are based on calculations of actual sources and effects. The Nitrogen Oxide Protocol of 1988 required parties to stabilize their nitrogen oxide emissions or their transboundary fluxes at 1987 levels by 1994. The Protocol covered major stationary sources (for example, power plants) and mobile sources (for example, vehicle emissions), and provided for the eventual negotiation of internationally accepted critical loads for nitrogen oxide pollution to take effect after 1996. The approach is considered better suited to regional environmental protection than flat-rate emission reductions.[71] Between 1991 and 1998, three protocols were adopted to regulate emissions from volatile organic compounds, persistent organic pollutants, lead, cadmium and mercury. Finally, in 1999, ECE adopted the Gothenburg Protocol to abate the adverse effects of acidification, eutrophication and ground-level ozone on human health, natural ecosystems and crops resulting from transboundary air pollution. The protocol recognizes the need for a precautionary approach and requires that emissions not exceed the critical loads stipulated in the annexes. It should be noted that in May 2012, the parties to the Convention made a historic step by amending the Gothenburg Protocol with regard to certain substances to include black carbon — as a component of particulate matter — in the revision of the Gothenburg Protocol;[72] and black carbon, ozone and methane in the medium and long-term workplans of the Conventions as important air pollutants and short-lived climate forcers.[73]

34. **1992 Convention on the Transboundary Effects of Industrial Accidents**. Like the Convention on Long-range Transboundary Air Pollution, the Convention on the Transboundary Effects of Industrial Accidents[74] was negotiated by ECE as part of its legal framework to protect the environment. The Convention aims to protect both

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[70] Ibid., p. 346. For this reason, it has been noted, the need to apply the precautionary principle was obviated in this case, although the Protocol's preamble acknowledges scientific uncertainty and precautionary principle.

[71] Birnie, Boyle and Redgwell, *International Law and the Environment* (see footnote 18 above), p. 347.

[72] Amendment of the text of and annexes II to IX to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to the Convention on Long-range Transboundary Air Pollution and the addition of new annexes X and XI, annex, article 10, new para. 3.

[73] For background study, see "Hemispheric transport of air pollution 2010" (ECE/EB.AIR/2010/10 and Corr.1 and 2). On the need to integrate the regulation of atmospheric pollutants and climate-forcing substances, see also the comprehensive new report *On Thin Ice: How Cutting Pollution Can Slow Warming and Save Lives* (World Bank and International Cryosphere Climate Initiative, 2013). Available from www.worldbank.org/content/dam/Worldbank/document/SDN/Full_Report_On_Thin_Ice_How_Cutting_Pollution_Can_Slow_Warming_and_Save_Lives.pdf.

[74] United Nations, *Treaty Series*, vol. 2105, No. 36605.

humans and the environment from the far-reaching transboundary effects of industrial accidents such as the mine tailings spill at Baia Mare (Romania). In article 3, paragraph 4, the Convention affirms the principle of State responsibility and obligates Parties to take legislative, regulatory, administrative and financial measures to prevent industrial accidents and improve preparedness and response measures.[74] Parties are to identify hazardous operations within their borders (article 4, para. 1) and site new projects where risks for environmental harm are minimal (article 7). The Convention creates a framework for international cooperation that extends beyond assistance in the event of an accident. Parties are required to inform and consult other parties that could potentially suffer from the transboundary effects of hazardous operations and to draw up joint or compatible contingency plans. The Convention also promotes the exchange of information and safety technologies and cooperation in research and development. In order to help States to better respond to accidents, the Convention calls on parties to set up an industrial accident notification system to immediately inform affected parties. The Conference of the Parties, as the governing body, reviews the implementation of the Convention and defines priorities of work.

35. **2002 Association of Southeast Asian Nations Agreement on Transboundary Haze Pollution**. The Agreement was drafted as a legally binding regional environmental agreement in collaboration with UNEP, in an attempt to remedy some of the compliance problems associated with previous efforts to tackle the problem of heavy haze in the area, such as the Regional Haze Action Plan. Recognizing the transboundary health and environmental effects of haze (largely originating from recurrent forest and land fires in Indonesia and Brunei Darussalam), the Agreement, in article 2, encourages regional and international cooperation to prevent and monitor transboundary air pollution. It adopts the preventive principle and requires States to identify and monitor fire-prone areas and to take necessary preventative measures, but does not define the measures or provide specific standards. Consistent with the cooperative approach of the Association of Southeast Asian Nations (ASEAN), the Agreement contains provisions for the exchange of information and technology, the development of a regional early warning system and mutual assistance. It establishes an ASEAN Coordinating Centre for Transboundary Haze Pollution Control to facilitate such cooperation and coordination in managing the impact of fires. However, in reflecting a traditional emphasis on sovereignty, the Agreement stipulates that a party must request or consent to such assistance, notwithstanding transboundary effects. Although the Agreement ultimately suffers from compliance problems, owing to a lack of provisions on monitoring and enforcement and to non-participation by the main target actor, it does attempt to overcome some of the barriers to implementation; for example, it establishes an ASEAN Transboundary Haze Pollution Control Fund to address the issue of financial capacity. It also creates an intergovernmental body, the Conference of the Parties, to evaluate implementation and adopt protocols or amendments, as necessary. Overall, it can be said that the Agreement represents a more concrete and law-oriented approach in dealing with the haze problem.[75]

[75] See A. K. J. Tan, "The ASEAN Agreement on Transboundary Haze Pollution: prospects for compliance and effectiveness in post-Suharto Indonesia", *New York University Environmental Law Journal*, vol. 13, No. 3 (2005), pp. 647-722; Rodziana Mohamed Razali, "The shortcomings of the ASEAN legal mechanisms to address transboundary haze pollution and proposal for improvement", paper submitted to the Third Biannual Conference of the Asian Society of International Law, Beijing, 28 August 2011.

36. **2001 Stockholm Convention on Persistent Organic Pollutants**. The Convention seeks to protect human health and the environment from the risks posed by persistent organic pollutants, which are chemical substances that possess toxic properties, resist degradation and bio-accumulate through the food chain. UNEP initiated negotiations in response to calls for global action in the light of scientific evidence on the harmful effects of such pollutants and their ability to travel long distances through the air and water. The Convention is mindful of the precautionary approach and obligates parties to eliminate or reduce the production and use of 12 persistent organic chemicals (pesticides, industrial chemicals and unintentionally produced persistent organic chemicals). Other key elements include: the requirement to prohibit or restrict the import and export of listed persistent organic chemicals; the development and use of safer substitutes, environmentally sound management of stockpiles and wastes; and the promotion of best alternative technologies and best environmental practices. The Convention recognizes that the ability of developing countries to implement their obligations will depend on the transfer of technology, financial resources and technical assistance from industrialized countries, and designates the Global Environment Facility as an interim financial mechanism for providing assistance. The institutions and procedures created by the Convention are of significance since they are the source of its flexibility and dynamism. The meetings of the Conference of the Parties, the governing body of the Convention, allow for regular review of implementation and the adoption of amendments. During the first meeting of the Conference of the Parties, the decision was made to create a Persistent Organic Pollutant Review Committee. The scientific body, comprising 31 experts, reviews proposals for new additions to the list of regulated chemicals according to the procedure established by the Convention. First, the Committee applies the screening criteria of the Convention in respect of new persistent organic chemicals. Second, if all the criteria are met, it drafts a risk profile to evaluate whether a substance is likely, as a result of long-range environmental transport, to lead to significant adverse effects on human health or the environment, thereby warranting global action. Third, it develops a risk management evaluation, taking into account socioeconomic considerations, and makes a recommendation to the Conference of the Parties, which makes the final decision. To date, the Conference of the Parties has decided to include 10 new substances: 9 chemicals at the fourth meeting in 2009 and endosulfan at the most recent meeting in April 2011.

37. **1991 Canada-United States Air Quality Agreement**. The Canada-United States Air Quality Agreement was signed on 13 March 1991 in order to address the issue of transboundary air pollution leading to acid rain. At the heart of the bilateral agreement are commitments by both parties to control transboundary air pollution. Annex I of the Agreement establishes specific objectives and deadlines for each country for sulfur dioxide and nitrogen oxide emissions limitations, affecting the main chemicals contributing to acid rain. The Agreement reaffirms the decision in the *Trail Smelter* case and principle 21 of the Stockholm Declaration and creates a framework for addressing shared concerns. It "applies customary environmental rules, such as the prior assessment of proposed actions, activities, and projects if they are likely to cause significant transboundary air pollution, the duty to notify the other state concerning such activities or projects as well as those that create the risk of significant transboundary harm, and to consult on request of the other party".[76] It is evident that a great deal of cooperation is envisaged by the system: it calls for

[76] Kiss and Shelton, *International Environmental Law* (see footnote 18 above), p. 572.

scientific and technical cooperation in addition to emissions monitoring and consultation. In order to assist in implementing the Agreement and review progress, a permanent bilateral Air Quality Committee was established. The International Joint Commission, a body created under the 1909 Boundary Waters Treaty, has oversight over the Air Quality Committee. The International Joint Commission has an important function with respect to enforcement: a party may refer a dispute to it. Furthermore, the International Joint Commission solicits/reports on views from the public and exposes the process to public scrutiny.[77] In December 2000, the Ozone Annex was added to the Agreement in order to address the issue of transboundary air pollution leading to high levels of ground-level ozone. Pursuant to the Ozone Annex, both countries commit to controlling and reducing their emissions of nitrogen oxides and volatile organic compounds (precursors to the formation of ground-level ozone), with a view to establishing ozone air quality standards in the long term.[78]

38. **1985 Vienna Convention for the Protection of the Ozone Layer**. The Vienna Convention was the first multilateral treaty to address a global atmospheric issue.[79] Together with the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) and its subsequent amendments, it comprises the legal regime for the protection of the stratospheric ozone layer. Treaty negotiations were initiated by UNEP in response to scientific evidence that widely used chemical substances, chlorofluorocarbons, were destroying the ozone layer. The resulting treaty, in the form of a framework convention, led to a general obligation on the part of States to take appropriate legislative or administrative measures, as stated in its preamble, "to protect human health and the environment against adverse effects resulting from modifications of the ozone layer". The Vienna Convention does not set specific targets, name particular substances to which the measures would relate (it merely lists in an annex the substances thought to have an effect on the ozone layer) or create a legal obligation to reduce emissions of ozone-depleting substances. The nature of the measures to be taken was left to the discretion of each State party. Instead, it emphasizes cooperation in the exchange of systemic observations, research, information and technology, as well as cooperation in formulating "agreed measures, procedures and standards for the implementation of this Convention" (article 2, para. 2 (c)). In recognizing the global nature of the problem, the drafters of the treaty tried to ensure participation by all countries. They considered some of the reservations that developing countries might have regarding the costs of implementing the treaty, both in terms of the cost of alternative technologies and in terms of the effect on development. As a result, in addition to a weak transfer of technology clause (article 4), a proviso was added that measures should be taken in accordance with "the means at their disposal and their capabilities" (article 2, para. 2). A bare-bones framework, the success of the Convention was in laying the foundation for future

[77] Jason Buhi and Lin Feng, "The International Joint Commission's role in the United States-Canada transboundary air pollution control regime: a century of experience to guide the future", *Vermont Journal of Environmental Law*, vol. 11 (2009), p. 129.

[78] A further supplementary annex on particulate matter is currently under negotiation.

[79] The first bilateral instrument was the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, adopted at Moscow on 5 August 1963 (United Nations, *Treaty Series*, vol. 480, No. 6964, p. 480), prompted by the global risk of radioactive pollution fallout from the atmosphere. It is noteworthy to recall the historic speech by President John F. Kennedy (his commencement address at American University, on 10 June 1963), announcing his support for the Treaty, in which he said: "[W]e all inhabit this small planet. We all breathe the same air. We all cherish our children's futures".

cooperation and creating the institutions, namely, the Conference of the Parties, which would enable it to adapt in response to new scientific data through reviews of the implementation and adoption of new protocols or amendments. It also signified a more precautionary approach in environmental treaties, given that the effects of ozone depletion and the harmful effects of ultraviolet rays were still speculative.

39. **1987 Montreal Protocol to the Vienna Convention**. The Montreal Protocol obligates States parties to limit the production and consumption of chlorofluorocarbons and halons, the key ozone-depleting substances. The Protocol was adopted in response to an international UNEP/World Meteorological Organization assessment prompted by the discovery of a "hole" in the ozone layer above Antarctica. The assessment revealed that chlorofluorocarbon production levels would lead to dangerous ozone depletion, indicating a need for firm targets leading to reductions in the emissions of ozone-depleting substances.[80] The Montreal Protocol required industrialized countries to freeze production and consumption of chlorofluorocarbons at 1986 levels (the base year), to reduce them by half by 1999 and to freeze the consumption of halons at 1986 levels. The Protocol also established a Meeting of the Parties charged with making systematic observations of the ozone layer and responding to new scientific developments through the introduction, as necessary, of additional legal obligations upon States — a key component of its success. Amendments were made in 1989 (Helsinki), 1990 (London), 1992 (Copenhagen), 1997 (Montreal) and 1999 (Beijing). The amendments not only accelerated the phase-out of various substances and added new substances, they also addressed the important issues of participation by developing countries, non-compliance, and non-parties. The London amendments were particularly significant in strengthening the principle of common but differentiated responsibilities. The preamble was amended to include a reference to the need to take into account the "developmental needs of developing countries". Furthermore, old article 5, which contained the provision of a 10-year compliance period for countries whose consumption of chlorofluorocarbons was less than 0.3 kg per capita (basically developing countries), was replaced with a new article 5, which recognized that compliance by developing countries will depend on financial assistance and the transfer of technology.[81] Meanwhile, article 10 established a multilateral fund voluntarily financed by non-article 5 parties to assist developing countries in meeting the costs of compliance. In respect of non-compliance, the Montreal Protocol has relied on soft enforcement, placing emphasis on a facilitative and promotional approach. Parties in difficulty can be brought before an implementation committee either by self-referral, referral by another party or by the Secretariat. It employs such measures as the provision of Global Environment Facility funding,[82] technical assistance or the issuing of cautions — mainly in an effort to ensure that parties comply with data reporting requirements. The Protocol has dealt with the problem of non-parties by taking an enforcement approach. It implements trade-

[80] Osamu Yoshida, *The International Legal Régime for the Protection of the Stratospheric Ozone Layer, International Law, International Régimes, and Sustainable Development* (The Hague; Boston, Kluwer Law International (Martinus Nijhoff, 2001); Sands, *Principles of International Environmental Law* (see footnote 18 above), p. 575.

[81] Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, agreed by the Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 27-29 June 1990 (UNEP/OzL.Pro.2/3, annex II).

[82] Peter H. Sand, "Carrots without sticks? New financial mechanisms for global environmental agreements", *Max Planck Yearbook of United Nations Law*, vol. 3 (1999), pp. 363-388.

restricting measures, namely, banning trade with non-parties in controlled substances or products containing such substances, and cutting illegal trade in chlorofluorocarbons through a system of export/import licences, which provide incentives to join and comply with the Protocol. The Protocol can be considered a success in that it has been widely adopted and implemented and in that global production of chlorofluorocarbons has decreased from the peak year of 1998. At the same time, it must be viewed within the greater scheme of atmospheric protection. Some chlorofluorocarbon substitutes are greenhouse gases, illustrating the need to coordinate efforts with the Kyoto Protocol to the United Nations Framework Convention on Climate Change.[83]

40. **1992 United Nations Framework Convention on Climate Change**. The General Assembly began intensifying its efforts to address climate change in 1988, adopting a resolution stating that climate change was a common concern of mankind (see General Assembly resolution 43/53). The following year, in recognition of the need to adopt measures to control anthropogenic emissions of greenhouse gases, it established the Intergovernmental Negotiating Committee to negotiate a treaty for the 1992 United Nations Conference on the Environment and Development. Much like the 1985 Vienna Convention for the Protection of the Ozone Layer, the United Nations Framework Convention on Climate Change does not establish quantitative commitments to limit greenhouse gases. As stated in article 2, its objective is framed in general terms: "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". There is no express commitment to return greenhouse emissions to 1990 levels by the year 2000, only a weakly worded recognition of a goal to that effect. The Convention establishes a number of key principles to guide any international response to climate change (many of the principles are also reflected in the Rio Declaration on Environment and Development and Agenda 21), including the principle of equity and common but differentiated responsibilities, sustainable development, cost-effectiveness, and precautionary measures (article 3). The core of the commitments to be undertaken by parties can be found in article 4. Parties that are developed countries (annex I) are required to "adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs" (article 4, para. 2 (a)). In order to promote implementation, article 4 also requires each of those parties to "communicate, within six months of the entry into force of the Convention for it and periodically thereafter, and in accordance with article 12, detailed information on its policies and measures, [...] as well as on its resulting projected anthropogenic emissions by sources and removal by sinks of greenhouse gases not controlled by the Montreal Protocol" (article 4, para. 2 (b)). Taken as a whole, the Convention provides a sound framework for future consideration of the issue; it establishes a Conference of the Parties and provides it with a wide enough mandate — one that includes review of the implementation and the adoption of protocols — to elaborate specific obligations.

41. **1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change**. The 1997 Kyoto Protocol was negotiated after the first Conference

[83] See United Nations Environment Programme, *Environmental Effects of Ozone Depletion and its Interactions with Climate Change: 2010 Assessment* (Nairobi, 2010). Available from http://ozone.unep.org/Assessment_Panels/EEAP/eeap-report2010.pdf.

of the Parties held in Berlin (the Berlin Mandate), which revealed the inadequacy of the commitments provided for in article 4 of the Convention. The Protocol set quantified emission reduction targets and a specific timetable for their achievement. Its major achievement was a commitment by developed countries (annex I parties) to reduce their emissions of six greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and per fluorocarbons) by a specified amount, with a view to reducing collective emissions by at least 5 per cent below 1990 levels in the 2008-2012 commitment period (article 3, para. 1). Parties could meet their commitments in any number of ways, including the enhancement of energy efficiency, the protection and enhancement of sinks and reservoirs of greenhouse gases and the promotion of sustainable forms of agriculture, to name only a few (article 2, para. 1 (a)). Significantly, developing countries were not assigned emission limitation and reduction commitments, in view of the concept of common but differentiated responsibilities. The principle was also reflected in provisions requiring the transfer of technology and financial assistance. Special consideration was given to countries most vulnerable to climate change, including small island developing States, countries with low-lying coastal areas, countries with areas prone to natural disasters and countries with areas liable to drought and desertification (article 4, para. 8). The Kyoto Protocol is particularly notable for several of the innovations it introduced. The agreement includes three "flexibility mechanisms", market mechanisms that aim primarily to achieve the cost-effective implementation of emission reduction commitments and secondarily to encourage widespread participation. Article 4 allows annex I parties to fulfil their emission limitation commitments jointly. The first two mechanisms, the joint implementation and the clean development mechanisms, are project based. Joint implementation enables one developed country to earn emission reduction units by investing in an emission-reduction project in another developed country (article 6). The clean development mechanism, the only flexibility mechanism that engages developing countries, allows developed country parties to earn saleable emission reduction credits by investing in reduction or emission-limitation projects in developing countries with a view to stimulating sustainable development (article 12). The mechanism is overseen by an executive board, and emission reductions from projects must be certified by designated national authorities (article 12, para. 4)). The third mechanism concerns international emissions trading. Permits are allocated to each party in accordance with their emission limitation obligations; any unused emission permits can be traded to other parties on the "carbon market" (article 17).[84] Monitoring provisions are important in promoting compliance with the regime. Annex I parties must establish national systems to estimate anthropogenic emissions by source and removal by sinks (article 5), as well as annual inventories to incorporate the supplementary information necessary to demonstrate compliance with the commitments under the Protocol (article 7, para. 2). It was agreed at the seventh session of the Conference of the Parties of the Framework Convention, held in Marrakesh, Morocco, in 2001, that the promotional approach established under the Montreal Protocol could not be relied upon to ensure compliance by annex I parties. Consequently, it took an enforcement approach and established a non-compliance mechanism whereby an enforcement

[84] Ian H. Rowlands argues that the introduction of these market-based instruments to environmental regimes is significant, "for it represents further commodification of the international environment" (Rowlands, "Atmosphere and outer space", in *The Oxford Handbook* (see footnote 21 above), p. 332).

branch would examine non-compliance by annex I countries[85] and imposed a penalty equal to 1.3 times the respective non-complying portions of their commitments. The penalty was to be added to their commitments for the second commitment period.[86] Since the first commitment period came to an end in 2012, the seventeenth session of the Conference of the Parties (Durban Conference), held in Durban, South Africa in 2011, decided to work on the content of a second commitment period set to begin in 2013. However, Canada, Japan and the Russian Federation made clear that they had no intention of assuming any obligations in the second commitment period. Canada announced on 12 December 2011 that it would withdraw from the Kyoto Protocol entirely. The Durban Conference also decided to "launch a process to develop a protocol, another legal instrument or agreed outcome with legal force" that would be "applicable to all parties,"[87] and that would be adopted no later than 2015 and come into effect from 2020. The eighteenth Conference of the Parties (Doha Conference), held in Doha in 2012, officially adopted an amendment to the Kyoto Protocol that contained the commitments of annex I parties during the second commitment period (2013-2020), but some developed countries decided that their commitments would not be prescribed in the amendment.[88] During the nineteenth session of the Conference of the Parties (Warsaw Conference), held in Warsaw in 2013, parties discussed the elements of an agreement to be adopted at the twenty-first Conference of the Parties, to be held in Paris in 2015. The Warsaw Conference decided to invite "all Parties" to elaborate their intended nationally determined "contributions" and to communicate them well in advance of the twenty-first conference, without prejudice to the legal nature of the contributions.[89]

2. Jurisprudence of international courts and tribunals

42. There are several judicial decisions by international courts and tribunals that should be examined carefully in the course of the study addressed in the present report. The *Trail Smelter* case laid the ground for the law on transboundary air pollution. Following the arbitration of the case, the 1973 *Nuclear Tests* cases (Australia v. France; and New Zealand v. France) before the International Court of Justice sparked heated discussions related to possible atmospheric pollution. The International Court of Justice also referred to the obligation of States to refrain from causing significant environmental damage beyond their borders through transboundary pollution, including atmospheric pollution, in its advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons* in 1996. Although not directly related to pollution of the atmosphere, the 1997 *Gabčikovo-Nagymaros Project* case (Hungary v. Slovakia) addressed the issue of environmental harm in a broader perspective. In the judgment of the *Pulp Mills on the River Uruguay* (Uruguay v. Argentina) case rendered in April 2010, the Court referred in part to the issue of alleged air pollution (to the extent relevant to the river's aquatic environment). Furthermore, the *Aerial Herbicide Spraying* case (Ecuador v. Colombia) brought to the Court in 2008, although subsequently settled and withdrawn, also concerned the subject. The 1996 World Trade Organization (WTO) case, *United States* —

[85] See FCCC/CP/2001/13/Add.3, decision 24/CP.7, annex. The decision was adopted by the first meeting of the Parties to the Kyoto Protocol on 9 and 10 December 2005.

[86] Murase, *International Law* (see footnote 19 above), p. 174.

[87] It may be noted here that there is no longer any reference to the principle of "common but differentiated responsibilities".

[88] See FCCC/KP/CMP/2012/13/Add.1, decision 1/CMP.8.

[89] See FCCC/CP/2013/10/Add.1, decision 1/CP.19.

Standards for Reformulated and Conventional Gasoline, posed the important question of the compatibility of a country's domestic law (in this case, the United States Clean Air Act of 1990) with the trade provisions of the WTO/General Agreement on Tariffs and Trade. Another decision of note is the judgement of the European Court of Justice in Luxembourg in December 2011, *Air Transport Association of America and Others. vs. Secretary of State for Energy and Climate Change*, confirming the validity of the European Union Directive's inclusion of aviation activities in the European Union emissions trading scheme. The decision could be challenged by the United States (and possibly China) in WTO, illustrating the "trade vs. environment" conflicts. A brief preliminary account of each of those cases may be appropriate in the present report to the extent that it is relevant to the topic of atmospheric protection.

43. ***Trail Smelter* case**. The case was concerned with cross-border damage in the State of Washington, United States, caused by smelting operations in Trail, British Columbia, Canada. At the smelting plant, zinc and lead-bearing ores were roasted to extract their metals. In the process, the ores, which also contained sulphur, discharged sulphur dioxide into the atmosphere. Owing to the physical and meteorological conditions prevalent in the area, the smelter's sulphur dioxide clouds moved southwards over the United States, causing extensive damage to crops, timber, pastures, livestock and buildings. The arbitral tribunal established pursuant to the 1935 convention for settlement of difficulties arising from the operation of the smelter at Trail was required pursuant to article IV of the Convention to apply "the law and practice followed in dealing with cognate questions in the United States of America as well as international law and practice, and [to] give consideration to the desire of the high contracting parties to reach a solution just to all parties concerned". A frequently quoted passage of the award reads as follows:

> [U]nder the principles of international law, as well as of the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.[90]

The *Trail Smelter* case was a traditional type of transboundary air pollution dispute — one in which the cause of the damage as well as its effect was sufficiently identifiable. The decision is frequently cited in support of the view that under international law States have a duty to ensure that activities within their jurisdiction and control do not cause transboundary damage when the injury is foreseeable, supported by clear and convincing evidence.[91] The standard of proof is to be established on the basis of empirical probability. It is important to note that the tribunal affirmed the preventive principle based on scientific evidence, and that it adopted a corresponding regime to maintain a certain level of emissions. The precedential value of the award, however, cannot be upheld completely without

[90] *Reports of International Arbitral Awards*, vol. III (United Nations publication, Sales No. 1949.V.2), p. 1907 ff (Award of 1941) and p. 1965; A. K. Kuhn, "The *Trail Smelter* arbitration, United States and Canada", *American Journal of International Law*, vol. 32 (1938), pp. 785-788; ibid., vol. 35 (1941), pp. 665-666; J. Read, "The *Trail Smelter* dispute", *Canadian Yearbook of International Law*, vol. 1 (1963), pp. 213-229.

[91] *Reports of International Arbitral Awards*, vol. III (United Nations publication, Sales No. 1949.V.2), p. 1965.

qualification:[92] while the tribunal relied on the principles of United States law in accordance with the *compromise*, the principles referred to in the award, such as nuisance, trespass and strict liability, cannot easily be equated with what are considered the established principles of international law in all circumstances.[93] The significance in the arbitration lies in the tribunal's ability to achieve a proper balancing of interests between industry and agriculture,[94] and by analogy, between economic development and environmental protection, which is in line with the modern concept of sustainable development.

44. ***Nuclear Tests* cases**. In the *Nuclear Tests* cases, Australia asked the Court in its application "to adjudge and declare that ... the carrying out of further atmospheric nuclear weapon tests in the South Pacific Ocean is not consistent with applicable rules of international law and to order that the French Republic shall not carry out further such tests".[95] While the Court indicated provisional measures on 22 June 1973, it rendered a judgment on 20 December 1974. It held that the objective pursued by the applicants, namely, the cessation of the nuclear tests, had been achieved by French declarations not to continue atmospheric tests and that the Court was therefore not called upon to give a decision on the claims put forward by the applicants.[96] It may be noted that Australia filed the case on the grounds of protecting not only its own legal interests but also the interests of other States since it considered French nuclear tests a violation of the freedom of the high seas. Its memorial stated, inter alia, that "[t]he sea is not static; its life systems are complex and closely interrelated. It is evident, therefore, that no one can say that pollution — especially pollution involving radioactivity — in one place cannot eventually have consequences in another. It would, indeed, be quite out of keeping with the function of the Court to protect by judicial means the interests of the international community, if it were to disregard considerations of this character".[97] On that point, the joint

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[92] Kevin J. Madders, "*Trail Smelter* arbitration", in *Encyclopedia of Public International Law*, vol. 4, Rudolf Bernhardt, ed., p. 903.

[93] Alfred P. Rubin, "Pollution by analogy: the *Trail Smelter* arbitration", *Oregon Law Review*, vol. 50 (1971), pp. 259-282.

[94] Günther Handl, "Balancing of interests and international liability for the pollution of international watercourses: customary principles of law revisited", *Canadian Yearbook of International Law*, vol. 13 (1975), pp. 156-194.

[95] Memorial on Jurisdiction and Admissibility submitted by the Government of Australia, Pleadings, *I.C.J. Reports 1973*, pp. 338-343, paras. 462-485.

[96] *Nuclear Tests (Australia v. France)*, *Nuclear Tests* (*Australia v. France*), *Interim Protection*, *Order of 22 June 1973*, *I.C.J. Reports 1973*, p. 99; *Nuclear Tests (Australia v. France)*, *Judgment*, *I.C.J. Reports 1974*, p. 253; *Nuclear Tests (New Zealand v. France)*, *Interim Protection*, *Order of 22 June 1973*, *I.C.J. Reports 1973*, p. 135; *Nuclear Tests (New Zealand v. France)*, *Judgment*, *I.C.J. Reports 1974*, p. 457. See H. Thierry, "Les arrêts du 20 décembre 1974 et les relations de la France avec la Cour internationale de justice", *Annuaire français de droit international*, vol. 20, No. 20 (1974), pp. 286-298; T. M. Franck, "Word-made law: the Decision of the ICJ in the *Nuclear Tests* cases", *American Journal of International Law*, vol. 69 (1975), pp. 612-620; P. Lellouche, "The International Court of Justice: the *Nuclear Tests* cases", *Harvard International Law Journal*, vol. 16 (1975), pp. 614-637; E. McWhinney, "International law-making and the judicial process: the World Court and the French *Nuclear Tests* case", *Syracuse Journal of International Law and Commerce*, vol. 3 (1975), pp. 9-46; S. Sur, "Les affaires des essais nucléaires", *Revue générale de droit international public*, vol. 79, 1975, pp. 972-1027; Ronald S. J. MacDonald and B. Hough, "The *Nuclear Tests* case revisited", *German Yearbook of International Law*, vol. 20 (1977), pp. 337-357.

[97] Memorial on Jurisdiction and Admissibility submitted by the Government of Australia, Pleadings, *I.C.J. Reports*, *Nuclear Tests Cases*, vol. 1, pp. 337 and 338.

dissenting opinion of Judges Onyeama, Dillard, Jiménez de Aréchaga and Waldock stated the following:

> With regard to the right to be free from atmospheric tests, said to be possessed by Australia in common with other States, the question of "legal interest" again appears to us to be part of the general legal merits of the case. If the materials adduced by Australia were to convince the Court of the existence of a general rule of international law, prohibiting atmospheric nuclear tests, the Court would at the same time have to determine what is the precise character and content of that rule and, in particular, whether it confers a right on every State individually to prosecute a claim to secure respect for the rule. In short, the question of "legal interest" cannot be separated from the substantive legal issue of the existence and scope of the alleged rule of customary international law. Although we recognize that the existence of a so-called *actio popularis* in international law is a matter of controversy, the observations of this Court in the *Barcelona Traction, Light and Power Company, Limited* case (*Second Phase, I.C.J. Reports 1970*, at p. 32) suffice to show that the question is one that may be considered as capable of rational legal argument and a proper subject of litigation before this Court.[98]

45. ***Nuclear Weapons* case**. In its advisory proceedings on the *Legality of the Threat or Use of Nuclear Weapons* case (request by the General Assembly 1996),[99] the International Court of Justice questioned whether the use of nuclear weapons would lead to damage to the environment, presumably including the atmospheric environment. The Court recognized "that the environment is under daily threat and that the use of nuclear weapons could constitute a catastrophe for the environment [and] ... that the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn".[100] The Court pronounced that "[t]he existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment".[101] However, it qualified its position by saying the following:

> The Court does not consider that the treaties in question could have intended to deprive a State of the exercise of its right of self-defence under international law because of its obligations to protect the environment. Nonetheless, States must take environmental considerations into account when assessing what is necessary and proportionate in the pursuit of legitimate military objectives. Respect for the environment is one of the elements that go to assessing whether an action is in conformity with the principles of necessity and proportionality.[102]

The Court noted furthermore that:

> Articles 35, paragraph 3, and 55 of Additional Protocol I provide additional protection for the environment. Taken together, these provisions embody a

[98] *I.C.J. Reports 1974*, p. 312, paras. 116-117.

[99] *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996*, p. 226.

[100] Ibid., para. 29.

[101] Ibid.

[102] Ibid., para. 30.

> general obligation to protect the natural environment against widespread, long-term and severe environmental damage; the prohibition of methods and means of warfare which are intended, or may be expected, to cause such damage; and the prohibition of attacks against the natural environment by way of reprisals. These are powerful constraints for all the States having subscribed to these provisions.[103]

In his dissenting opinion, Judge Weeramantry elaborated at length on the effects of nuclear weapons, especially damage to the environment and the ecosystems, and to future generations.[104]

46. ***Gabčikovo-Nagymaros Project* case**. The *Gabčikovo-Nagymaros Project* case was essentially concerned with the use of an international watercourse and was not directly related to the atmosphere. The International Court of Justice nonetheless touched on several issues relevant to the topic, the findings of which could also be applicable to the protection of the atmosphere. While Hungary essentially relied on a "state of ecological necessity" to justify the suspension or abandonment of certain works necessary for building the planned dams, Slovakia argued that the alleged state of necessity had not existed, and that, regardless, it did not constitute a reason for the suspension of the party's treaty obligations. The Court supported the latter position. With regard to the measures taken by Slovakia to divert water, the Court concluded that they could not be considered a lawful countermeasure, and thus Slovakia was not entitled to put the diversion installations into operation.[105] During the proceedings, Hungary presented several arguments in support of the lawfulness of its action, including the impossibility of performance of the 1977 Treaty (owing in part to ecological imperatives), a fundamental change of circumstances (owing in part to the progress of environmental knowledge) and the development of new norms and prescriptions in international environmental law. However, the Court, in rejecting the Hungarian contention, relied largely on the law of treaties embodied in the 1969 Vienna Convention and the law of State responsibility reflected in the Commission's 2001 draft articles rather than the principles and rules of international environmental law.[106] It may be noted that Judge Weeramantry discussed at length the concept of sustainable development in his separate opinion.[107]

47. ***Pulp Mills on the River Uruguay* case**. In the *Pulp Mills on the River Uruguay* case, which primarily concerned the river's water quality, the International Court of Justice referred in part to the issue of alleged air pollution to the extent relevant to

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[103] Ibid., para. 31.

[104] Ibid., pp. 429-555. See Edith Brown Weiss, "Opening the door to the environment and to future generations", in *International Law, the International Court of Justice and Nuclear Weapons*, in L. Boisson de Chazournes and Philippe Sands, eds. (Cambridge, Cambridge University Press, 1999), pp. 338-353; Djamchid Momtaz, "The use of nuclear weapons and the protection of the environment: the contribution of the International Court of Justice", pp. 354-374.

[105] *Gabčikovo-Nagymaros Project (Hungary/Slovakia), Judgment, I.C.J. Reports 1997*, p. 7 (see paras. 82-87).

[106] See "Symposium: the case concerning the Gabčikovo-Nagymaros project", *Yearbook of International Environmental Law*, vol. 8 (1997), pp. 3-118; Malgosia Fitzmaurice, "The *Gabčikovo-Nagymaros* case: the law of treaties", *Leiden Journal of International Law*, vol. 11 (1998), pp. 321-344; René Lefeber, "The *Gabčikovo-Nagymaros Project* and the law of state responsibility", pp. 609-623

[107] *I.C.J. Reports 1997*, p. 88.

the river's aquatic environment.[108] Argentina contended that emissions from the plant's stacks had deposited substances with harmful effects into the aquatic environment. The Court, however, found that "the record does not show any clear evidence that substances with harmful effects have been introduced into the aquatic environment of the river through the emissions of the ... mill into the air".[109] What is striking about the judgment is the Court's dismissal of virtually every argument made by Argentina concerning Uruguay's alleged breach of the latter's substantive obligations, on the ground of lack of evidence, with little elaboration of the substantive issues. The judgment was met with criticism in a joint dissenting opinion, and a separate opinion, as well as a declaration that the Court should have adopted inquisitorial methods (such as entrusting an enquiry to a commission) and should not have depended solely on evidence produced by the parties.[110] One of the distinctive features of environmental disputes, such as the case at hand, is that they are often fact intensive. Accordingly, the gathering and evaluation of scientific evidence is crucial. The *Pulp Mills* case thus posed the further question of what role the Court should play in the assessment of technical scientific evidence when settling environmental disputes.

48. ***Aerial Herbicide Spraying* case**. The *Aerial Herbicide Spraying* case was squarely concerned with alleged transboundary air pollution. In March 2008, Ecuador instituted proceedings against Colombia with respect to the "aerial spraying [by Colombia] of toxic herbicides at locations near, at and across its border with Ecuador".[111] In its application, Ecuador stated that "the spraying has already caused serious damage to people, to crops, to animals, and to the natural environment on the Ecuadorian side of the frontier, and poses a grave risk of further damage over time", and requested the Court to "adjudge and declare that: (a) Colombia has violated its obligations under international law by causing or allowing the deposit on the territory of Ecuador of toxic herbicides that have caused damage to human health, property and the environment; and that (b) Colombia shall indemnify Ecuador for any loss or damage caused by its internationally unlawful acts, namely the use of herbicides, including by aerial dispersion".[112] However, the case was removed from the Court's list on 13 September 2013 at the request of Ecuador since agreement had been reached between the parties regarding, inter alia, Colombia's discontinuance of aerial spraying and the creation of a joint commission.

49. ***United States — Standards for Reformulated and Conventional Gasoline* case**. The WTO dispute settlement case on the *United States — Standards for Reformulated and Conventional Gasoline* (1996)[113] presented a number of important issues on the protection of the atmosphere. It was the first ruling in which

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[108] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*, p. 14 (see paras. 263-264). The issue was raised during the oral proceedings. See *Pulp Mills on the River Uruguay (Argentina v. Uruguay)* Oral proceedings, 2006/47, paras. 22, 28 and 34.

[109] *I.C.J. Reports 2010*, para. 264.

[110] See the joint dissenting opinion of Judges Al-Khasawneh and Simma, *I.C.J. Reports 2010*, p. 108 (see paras. 1-6); the separate opinion of Judge Cançado-Trindade, ibid., p. 135 (see para. 151); and the declaration of Judge Yusuf, ibid., p. 216 (see paras. 1-14).

[111] Application by Ecuador, 31 March 2008.

[112] Ibid.

[113] World Trade Organization, document WT/DS2/R (1996), Report of the Panel: World Trade Organization, document WT/DS2/AB/R (1996), Report of the Appellate Body.

WTO dispute settlement procedures were employed.[114] In the case, Brazil and Venezuela (Bolivarian Republic of) requested that the Dispute Settlement Body examine the compatibility of the Clean Air Act and the "baseline establishment methods" of the "Gasoline Rule" promulgated by the United States Environmental Protection Agency with the relevant WTO provisions. The Clean Air Act and its regulations are intended to prevent and control air pollution in the United States by setting standards for gasoline quality and motor vehicle emissions. Under the 1990 amendment to the Act, new regulations on vehicular emissions of toxic air pollutants and ozone-forming volatile organic compounds were promulgated to improve air quality in the most polluted areas of the country. These new regulations applied to United States refiners, blenders and importers. In recognizing that clean air was a natural resource that could be depleted, the conclusion was reached that the baseline establishment methods were not consistent with article III.4 of the General Agreement on Tariffs and Trade and could not be justified under article XX (b), (d) and (g). The Panel found that imported and domestic gasoline were "like products" and that imported gasoline was treated less favourably than domestic gasoline. The United States appealed to the Appellate Body, arguing that the Panel erred in ruling that the baseline did not constitute a measure relating to the conservation of clean air within the meaning of article XX (g) of the General Agreement on Tariffs and Trade. The Appellate Body found that the United States Gasoline Rule was within the scope of the article XX (g) exemption, but that the United States measure constituted "arbitrary" or "unjustifiable" discrimination or a "disguised restriction" on international trade and thus failed to meet the requirements of the chapeau of article XX. Hence, the case demonstrated a conflict between a domestic law for the protection of clean air and an international regime for free trade, on which the Appellate Body decided in favour of the latter.

50. *Air Transport Association of America and Others vs. Secretary of State for Energy and Climate Change* case: The judgment of the European Court of Justice in Luxembourg on December 2011, *Air Transport Association of America and Others vs. Secretary of State for Energy and Climate Change*,[115] affirmed the validity of the inclusion of aviation activities in the European Union emissions trading scheme within European Union Directive 2008/101/EC. The decision could potentially be challenged by non-European countries in other forums, illustrating the trade vs. environment conflict.[116]

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[114] See, in general, Shinya Murase, "Unilateral measures and the WTO dispute settlement", *Asian Dragons and Green Trade: Environment, Economics and International Law*, Simon S. C. Tay and Daniel Esty, eds. (Times Academic Press, 1996, pp. 137-144).

[115] ECJ, 21 December 2011, Case No. 366/10; Jasper Faber and Linda Brinke, *The Inclusion of Aviation in the EU Emissions Trading System: An Economic and Environmental Assessment*, Trade and Sustainable Energy Series, Issue Paper No. 5 (Geneva, International Centre for Trade and Sustainable Development, September 2011); Jane Leggett, Bart Elias and Daniel T. Shedd, *Aviation and the European Union's Emission Trading Scheme*, Congressional Research Service Report for Congress R42392 (Washington, D.C., Congressional Research Service, 7 March 2012); Lorand Bartels, "The WTO legality of the Application of the EU emissions trading system to aviation", *European Journal of International Law*, vol. 23, No. 2 (2012), pp. 429-467.

[116] With regard to potential disputes on the European Union emissions trading system before the ICAO Council, see Jon Bae, "Review of the dispute settlement mechanism under the International Civil Aviation Organization: contradiction of political body adjudication", *Journal of International Dispute Settlement*, vol. 4, No. 1 (2013), pp. 65-81. Regarding ICAO activities to combat climate change in the field of aviation, see resolutions adopted at the thirty-eighth

3. Customary international law

(a) *Opinio juris* and general practice

51. In addition to the multilateral and bilateral conventions described above, there is abundant State practice and literature on the subject. The frequently cited *Trail Smelter* arbitration continues to be the leading case on transboundary air pollution. The principle of *sic utere tuo ut alienum non laedas* (use your own property so as not to injure that of another) applied in the award is now generally recognized as part of customary international law, although with certain qualifications and conditions. The principle is recognized as customary international law as far as transboundary air pollution between adjacent countries is concerned to the extent that cause and effect can be proved with clear and convincing evidence. Questions remain as to whether the same principle can be extended to the case of long-distance (transcontinental) air pollution, where the causal link is difficult to prove; and as to whether it can be extended to global atmospheric problems such as ozone depletion and climate change. Careful analysis is required in each case to determine whether and to what extent a principle or rule is considered "established" as customary international law in the light of *opinio juris sive necessitatis* and general State practice.[117] The assessment of evidence regarding the customary nature of a rule must be done on a case-by-case basis. It is generally understood that neither *opinio* unsupported by custom (usage) nor mere custom unsupported by *opinio* qualify as customary law.[118] There are also cases where customary law is in the making, rather than established, also known as "emergent rules of customary law".[119]

52. It is expected that a great part of the Commission's work on the present project, like all other projects, will be devoted to the determination of the customary status of given principles and rules relating to the protection of the atmosphere. From an analytical perspective, the distinction between established and emergent rules becomes important if a parallel is drawn between the work of codification, which is conducted on the basis of established customary law, and that of progressive

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session of the Assembly of the International Civil Aviation Organization, in 2013, entitled "Consolidated statement of continuing ICAO policies and practices related to environmental protection — general provisions, noise and local air quality (resolution A38-17) and "Consolidated statement of continuing ICAO policies and practices related to environmental protection — climate change" (resolution A38-18).

[117] *Colombian-Peruvian Asylum Case, Judgment of November 20th, 1950: I.C.J. Reports 1980*, p. 266) (see pp. 276 and 277); *North Sea Continental Shelf, Judgment, I.C.J. Reports 1969*, p. 3 (see para. 77).

[118] It is not always easy to categorize material as evidence of *opinio juris* or State practice. Sometimes, the same source (such as domestic legislation) is double-counted as evidence of both *opinio juris* and State practice.

[119] See *North Sea Continental Shelf, Judgment, I.C.J. Reports 1969*, p. 3 (see paras. 69-71). Denmark and the Netherlands asserted that, even if the provision in article 6 of the 1958 Convention on the Continental Shelf had not been considered as reflecting pre-existing customary law, that it, as a norm-creating provision, "constituted the foundation of, or has generated a rule which ... has since passed into the general corpus of international law". The Court stated that "this process is a perfectly possible one and does occur from time to time: it constitutes indeed one of the recognized methods by which new rules of customary international law may be formed". Although the Court did not accept the contention by Denmark and the Netherlands on this particular provision of article 6, the Special Rapporteur considers there to be a strong basis for the progressive development of "emergent rule(s) of customary law", if supported by other material sources of law such as non-binding instruments, domestic law and domestic court decisions and other relevant incidents of State practice.

development, which is conducted on the basis of emergent rules of customary law.[120] However, the Commission does not seem very concerned about distinguishing the two types of work, suggesting that the difference between the two sources of rules may not be that significant in the actual context of codification and progressive development (unlike the context of judicial process in which the distinction could have a decisive impact on the determination of whether a particular provision of a convention is representative of a pre-existing customary law). Of greater importance is the distinction between emergent rules of customary law and rules that have not yet reached the necessary stage of maturity to be called emergent. Elaborating such rules would simply be an exercise in law-making, which, being outside the mandate of the Commission, should be avoided. The crucial task entrusted to the Commission is thus to clarify which elements are considered as constituting emergent rules of customary law suitable for progressive development. Again, this must be determined on a case-by-case basis. It is therefore necessary to look to the various materials that may be deemed relevant in determining what constitutes an emergent rule of customary international law. Accordingly, the material sources *praeter legem* (outside, but close to, the formal sources of law) should be examined.

(b) Non-binding instruments

53. Non-binding instruments are an important source for determining *opinio juris*. They include:

- Council of Europe Committee of Ministers resolution (71) 5 on air pollution in frontier areas (1971)
- Declaration of the United Nations Conference on the Human Environment (1972)
- Organization for Economic Cooperation and Development, Recommendation of the Council on Principles concerning Transfrontier Pollution (1974)
- Organization for Economic Cooperation and Development, Recommendation of the Council for the Implementation of a Regime of Equal Right of Access and Non-Discrimination in Relation to Transfrontier Pollution (1974)
- Rio Declaration on Environment and Development (1992)
- Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia (1998)
- Acid Deposition Monitoring Network in East Asia
- International Law Commission, draft articles on prevention of transboundary harm from hazardous activities (2001)
- International Law Commission draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)

[120] For an enlightening analysis on the interrelationship of codification and progressive development, see Donald McRae, "The interrelationship of codification and progressive development in the work of the International Law Commission", *Kokusaiho Gaiko Zassi* (*Journal of International Law and Diplomacy*), vol. 111 (2013), pp. 76-94.

- Eastern Africa Regional Framework Agreement on Air Pollution (Nairobi, 2008)[121]
- Southern African Development Community Regional Policy Framework on Air Pollution (Lusaka, 2008)[122]
- West and Central Africa Regional Framework Agreement on Air Pollution (Abidjan, 2009)[123]
- North African Framework Agreement on Air Pollution (2011)[124]

54. Although not binding in form, some soft-law instruments are very important as they reflect material sources of international law; a brief account of some of those documents is therefore appropriate.

55. **Declaration of the United Nations Conference on the Human Environment**.[125] The Stockholm Declaration of the United Nations on the Human Environment (1972) (the Stockholm Declaration) laid the ground for international environmental law in the twentieth century. It contains a set of "common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment",[126] although it does not specifically refer to the protection of the atmosphere.[127] The most important provision of the Declaration is principle 21, which asserts that States have the responsibility to ensure that activities within their jurisdiction and control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. While the word "responsibility" (to ensure) is somewhat ambiguous (the word "devoir" is used in the French text), the principle is now widely considered to have acquired the status of customary international law as far as transboundary air pollution is concerned, having been incorporated into several conventions.[128]

56. **Rio Declaration on Environment and Development**.[129] The Rio Declaration was a product of the 1992 United Nations Conference on Environment and Development. While it is non-binding, it establishes general principles on sustainable development, thereby providing the foundation for future environmental protection

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[121] Available from www.sei-international.org/gapforum/index.php/the-news/58-global-forum-welcomes-new-eastern-africa-regional-framework. See also Lars Nordberg, *Air Pollution: Promoting Regional Cooperation* (UNEP, 2010).

[122] Available from www.unep.org/urban_environment/PDFs/SADC-LusakaAgreement.pdf.

[123] www.unep.org/urban_environment/PDFs/BAQ09_AgreementEn.Pdf.

[124] Available from www.htap.org/meetings/2011/2011_06/presentations/110606d%20Iyngara%20HTAP_UNEP.pdf.

[125] Adopted at Stockholm on 16 June 1972, see *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972* (A/CONF.48/14/Rev.1), part one, chap. I.

[126] L. Sohn, "The Stockholm Declaration on the Human Environment", *Harvard International Law Journal*, vol. 14 (1972), p. 423 ff.

[127] Principle 6 provides that "The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems ...".

[128] Murase, *International Law* (see footnote 19 above), p. 24.

[129] Adopted at Rio de Janeiro on 14 June 1992, see *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

regimes. In addition to general principles, the Declaration contains specific provisions on procedural elements, such as access to information and opportunities for public participation (principle 10); environmental impact assessments (principle 17); and notification, information exchange and consultation (principle 19). In that way, it can be seen as a framework for environmental law-making at the national and international levels and a benchmark against which future developments can be measured.[130] Significantly, the Declaration represents a paradigm shift from environmental law to the law of sustainable development. The shift is evident in the wording of principle 2, a slightly modified version of principle 21 of the Stockholm Declaration. It states that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction". The Declaration recognizes that in order to effect substantial change, environmental concerns must be integrated into the greater framework of economic development; its stated purpose is to elaborate strategies and measures to halt and reverse the effects of environmental degradation in the context of strengthened national and international efforts to promote sustainable and environmentally sound development in all countries. The Declaration can be viewed as a compromise between developed countries primarily concerned with environmental protection and developing countries primarily concerned with economic development. That balance is evident in its key provisions, principles 3 and 4, respectively. Principle 3 states that the right to development must be fulfilled as to equitably meet developmental and environmental needs of present and future generations. Principle 4, in turn, states that, in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. Read together, the two principles form the core of sustainable development. The Declaration goes on to codify several important principles contained within the concept of sustainable development: the precautionary principle,[131] equity (both intragenerational and intergenerational),[132] and common but differentiated responsibilities.[133] The principles laid down in the Rio Declaration have significantly guided subsequent environmental treaties.

57. **Acid Deposition Monitoring Network in East Asia**. The Acid Deposition Monitoring Network in East Asia was developed as part of the initiative to establish a regional framework for the control of transboundary air pollution. Owing to rapid economic growth and industrialization, many countries in the East Asia region are

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[130] Sands, *Principles of International Environmental Law* (see footnote No. 18 above), p. 54.

[131] Principle 15 of the Rio Declaration on Environment and Development represents a comparatively weak version of the precautionary principle.

[132] Principle 3 of the Rio Declaration on Environment and Development refers to the needs of both present and future generations: "The right to development must be fulfilled as to equitably meet developmental and environmental needs of present and future generations".

[133] Principle 7 of the Rio Declaration on Environment and Development states that "States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries, acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command."

facing a serious threat from air pollution, including acid deposition. Regional cooperation for countermeasures to prevent regional air pollution is urgently needed. Led by Japanese efforts, the Network aims to reduce the adverse impacts of acid deposition on human health and the environment. As the institutional framework for the Network, the Intergovernmental Meeting is the decision-making body, and the Scientific Advisory Committee, composed of scientific and technical experts, is established under the Intergovernmental Meeting. The secretariat and the Network Centre are designed to support the Network. By 2010, 54 deposition monitoring sites had been set up in 10 participating States, and ecological surveys had been conducted at 44 sites (forests, lakes and rivers) in the region.[134]

58. **International Law Commission draft articles on prevention of transboundary harm**. The Commission, while addressing State responsibility for wrongful acts, also turned its attention to liability for lawful acts. Based on the recommendation of the Working Group (established to consider the topic), the Commission decided that the two aspects of the topic, namely, prevention and remedial measures, should be dealt with separately.[135] In 2001, the Commission adopted and submitted the final text of the draft articles on prevention of transboundary harm to the General Assembly. The draft articles represent the Commission's attempt not only to codify but to progressively develop the law through its elaboration of the procedural and substantive content of the duty of prevention. Underpinning the articles is the principle of *sic utere tuo ut alienum non laedas* (as articulated in the *Trail Smelter* case and in principle 21 of the Stockholm Declaration). Article 3 states that the State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof. The obligation to prevent transboundary harm is based on a standard of due diligence. Due diligence further involves the duty to assess the risk of activities likely to cause significant transboundary harm (article 7) and the duty to notify and provide relevant information to State(s) likely to be affected (article 8). Read with the duty of prior State authorization for risk-posing activities, the draft articles illustrate the interrelatedness of prevention and precaution, and endorse the precautionary principle with regard to environmental protection. In addition to elaborating the duty of due diligence, the articles codify several important overarching principles, some already well-established in international law and some referred to with increasing frequency in international environmental treaties. The Commission refers to the duty to cooperate in good faith (article 4) in preventing significant transboundary harm and to seek solutions "based on an equitable balance of interests" (article 9).

59. **International Law Commission draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities**. The Commission resumed its work on the issue of liability with respect to transboundary harm in 2002, "bearing in mind the interrelationship between prevention and

[134] The Acid Deposition Monitoring Network in East Asia was adopted in Jakarta in March 2000; see W. Takahashi, "Formation of an East Asian regime for acid rain control: the prospective of comparative regionalism", *International Review for Environmental Strategy*, vol. 1 (2000), pp. 97-117; thirteen countries, namely, Cambodia, China, Indonesia, Japan, the Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, the Philippines, the Republic of Korea, the Russian Federation, Thailand and Viet Nam, have participated in the Network.

[135] International Law Commission, draft articles on prevention of transboundary harm from hazardous activities (see A/56/10 and Corr.1, paras. 91, 94 and 97).

liability".[136] The scope of activities included in the draft principles remains the same as in the draft articles. The purpose of the draft principles is twofold: first, to "ensure prompt and adequate compensation to victims of transboundary damage"; and second, to "preserve and protect the environment in the event of transboundary damage, especially with respect to mitigation of damage to the environment and its restoration or reinstatement" (principle 3). It is significant that the principles recognize the intrinsic value of the environment and prioritize its protection/preservation. In conjunction with the draft articles, they reinforce the principles of equity and sustainable development. Compensation is based on the polluter pays principle. In requiring "prompt and adequate compensation" (principle 4) for transboundary environmental damage, the cost-benefit analysis of preventive measures is altered; environmental costs (for example, control and remedial measures) are internalized, giving operators a greater incentive to take preventive measures. The draft principles do not provide for State liability. Instead, they provide for operator liability on a strict liability basis. The role of the State is to put in place a system of victim compensation through the adoption of national laws or international agreements. The principles attempt to create a framework to guide States with its substantive and procedural provisions. At the substantive end is principle 4, the provision of prompt and adequate compensation for victims of transboundary damage[137] (comprising assignation of liability without proof of fault, specification of minimum conditions, and establishing insurance, bonds or other financial guarantees to cover liability). It should be noted that a threshold of "significant" transboundary harm must be met in order to trigger the application of the regime.[138] At the procedural end is principle 6: the provision of domestic and international procedures for claim settlements (comprising non-discriminatory access, availability of effective legal remedies, and access to information). The provisions are neither couched in the language of rights or obligations, nor do they address the issue of non-operator State liability.

(c) Domestic legislation

60. Domestic legislation is important in so far as it addresses issues of transboundary harm to and global protection of the atmosphere. Inspiration may also be derived from laws of purely domestic concern that can be applied by analogy to the relevant international legal issues. Domestic law can be cited as evidence of State practice, and as such, constitute existing or emergent customary international law. It is also noteworthy that certain domestic legislation can have the norm-

[136] See A/61/10, paras. 62 and 63; see also General Assembly resolution 61/36, annex.

[137] Under principle 2, "Damage" means "significant damage caused to persons, property, or the environment." It includes, among other things, the costs of reasonable response measures and of reinstatement of the property, or environment including natural resources.

[138] Commentary 2 of principle 2 notes that "significant" transboundary harm is something more than "detectable" but need not be at the level of "serious" or "substantial". See the commentary to draft article 2, paras. 4 and 5, A/56/10 and Corr.1, para. 98.

creating effect of opposability.[139] For instance, it can be said that in the *Gasoline* case of the WTO Dispute Settlement Body (see para. 49 above), the central issue was whether the Clean Air Act of the United States was or was not opposable vis-à-vis Brazil and Venezuela (Bolivarian Republic of).[140] In any event, the Special Rapporteur hopes to be supplied with relevant information on domestic legislation as well as the judicial decisions of the domestic courts referred to in paragraph 61 below.

(d) Jurisprudence of domestic courts

61. The decisions of domestic courts are also instructive to the extent that they are relevant to the protection of the atmosphere. As with domestic legislation, inspiration may be derived from domestic court decisions that can be applied to an international law context. Typically, the most relevant cases are those involving transboundary air pollution such as the 1957 *Walter Poro vs. Houillères du Bassin de Lorraine* case along the French-German border.[141] However, there have also been pertinent cases involving global issues, notably, *Massachusetts v. EPA* (2 April 2007), which dealt with the question of whether the United States Environmental Protection Agency could decline to regulate carbon dioxide and other greenhouse gases.[142] Japanese courts have dealt with a number of cases related to air pollution[143] from which important analogies can be drawn to the protection of the atmosphere at the international level.

(e) Other relevant incidents

62. Incidents falling outside the categories listed above should also be taken into account and analysed to the extent to which they are considered relevant to State practice. For instance, atmospheric nuclear testing in the 1950s manifested itself as one of the first environmental issues to be confronted by the international

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[139] It is well known that certain domestic measures based on domestic law have generated the creation of new international law, such as the regimes of conservation zones (*Bearing Sea Fur Seals* arbitration, United Kingdom v. United States, *Moore's International Arbitral Awards*, vol. 1 (1893), p. 755) and preferential fishery zone (*Fisheries Jurisdiction*, United Kingdom v. Iceland, *I.C.J. Reports 1974*, p. 6 ff). See, on the concept of opposability and its law-making function, Shinya Murase, "Unilateral measures and the concept of opposability in international law", in Murase, *International Law* (see footnote 19 above), pp. 216-266.

[140] Murase, *International Law* (see footnote 19 above), pp. 273-274.

[141] *Walter Poro vs. Houillères du Bassin de Lorraine (HBL)*, Court of Appeals (*Oberlandesgericht*, 2nd Civil Chamber) of Saarbruecken, Germany, 22 October 1957 (Z U 45/57), upon appeal against a judgment of 12 February 1957 by the Saarbruecken District Court (*Landgericht*) as court of first instance; English summary in Peter H. Sand, *Transnational Environmental Law: Lessons in Global Change* (Kluwer Law International, 1999), pp. 89, 90 and 121; see also Alfred Rest, "International environmental law in German courts", *Environmental Policy and Law*, vol. 27 (1997), p. 412.

[142] See, for example, *Massachusetts v. EPA*, U.S. Supreme Court decision of 2 April 2007 (549 U.S. 497; 127 S. Ct. 1438; 2007 U.S. LEXIS 3785) which was concerned in part with certain obligations of the Environmental Protection Agency (EPA) to regulate emissions of greenhouse gases.

[143] See Eri Osaka, "Re-evaluation of the role of the tort liability system in Japan", *Arizona Journal of International and Comparative Law*, vol. 26 (2009), pp. 413-423.

community.[144] Accidents at nuclear facilities can have direct impacts on the atmosphere, as demonstrated by the accidents at Chernobyl in 1986 and Fukushima in 2011 (caused by the devastating earthquake and tsunami of 11 March 2011), are currently a major concern not only for Japan but the international community in general.

4. Literature

63. A selected bibliography of the relevant international legal issues can be found in the syllabus on the topic, "Protection of the atmosphere", annexed to the report of the International Law Commission in 2011 (A/66/10, annex B).

III. Definition

A. Physical characteristics of the atmosphere

64. In order to determine the definition, scope and objective of the exercise of codification and progressive development of international law on the protection of the atmosphere and characterize the legal status of the atmosphere, it is first necessary to understand the physical structure and characteristics of the atmosphere.

65. The "atmosphere" is "the envelope of gases surrounding the earth".[145] The average composition of the atmosphere up to an altitude of 25 km is as follows: nitrogen (78.08 per cent), oxygen (20.95 per cent), argon (0.93 per cent), carbon dioxide (0.03 per cent), trace gases (0.01 per cent) and water vapour[146] in highly variable amounts. The atmosphere exists in what is called the atmospheric shell.[147] Physically, it extends upwards from the earth's surface, the bottom boundary of the atmosphere. It is divided vertically into four atmospheric spheres on the basis of temperature characteristics, namely, from the lower to upper layers: troposphere,

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[144] See, for example, the *Daigo Fukuryumaru* (Lucky Dragon No. 5) incident (Japan-United States) in 1954; Shigeru Oda, "The hydrogen bomb tests and international law", *Friedenswarte*, vol. 53 (1956), pp. 126-135; L.F.E. Goldie, "A general view of international environmental law", in *The Protection of the Environment and International Law*, A. C. Kiss, ed., (The Hague Academy of International Law, 1975), pp. 72-73.

[145] *The Concise Oxford English Dictionary*, 12th ed. (New York, Oxford University Press, 2011). A similar definition is found in *Oxford English Dictionary* (Oxford University Press, 2014, online; *The New Shorter Oxford English Dictionary* (Oxford, Clarendon Press, 1993); *Webster's Third New International Dictionary of the English Language Unabridged* (Springfield, Massachusetts, G. and C. Merriam, 1961); and *Le Grand Robert de la langue française*, vol. 1 (Paris, Dictionnaires Le Robert, 1985) (enveloppe gazeuse qui entoure le globe terrestre). The American Meteorology Society physically defines the atmosphere as "a gaseous envelope gravitationally bound to a celestial body". See http://amsglossary.allenpress.com/glossary/search?id=atmosphere1.

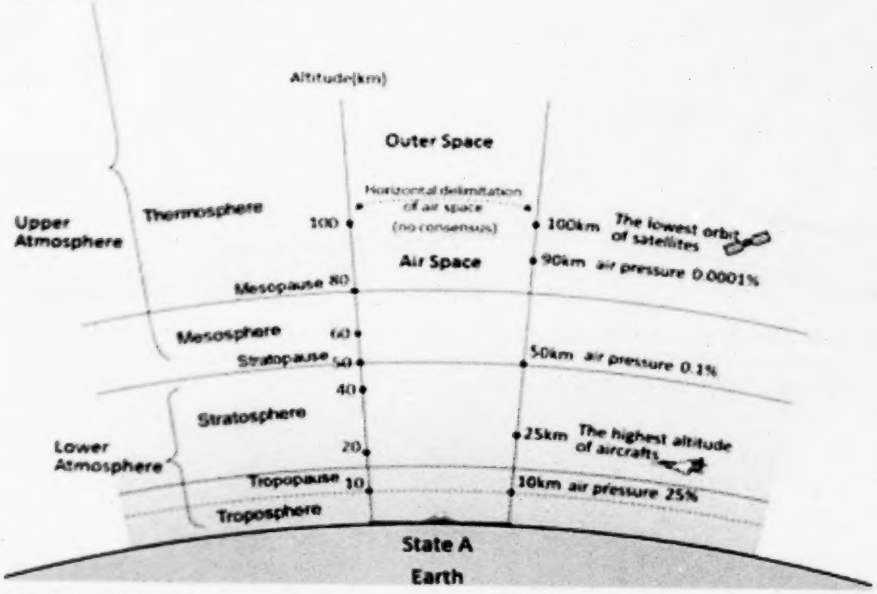
[146] Physically, water vapour, which accounts for roughly 0.25 per cent of the mass of the atmosphere, is a highly variable constituent. In atmospheric science, "because of the large variability of water vapor concentrations in air, it is customary to list the percentages of the various constituents in relation to dry air". Ozone concentrations are also highly variable. Over 0.1 ppmv (parts per million by volume) of ozone concentration in the atmosphere is considered hazardous to human beings. See John M. Wallace and Peter V. Hobbs, *Atmospheric Science: An Introductory Survey*, 2nd ed. (Boston, Elsevier Academic Press, 2006), p. 8.

[147] The American Meteorology Society defines the "atmospheric shell" (also called atmospheric layer or atmospheric region) as "any one of a number of strata or 'layers' of the earth's atmosphere" (http://amsglossary.allenpress.com/glossary/search?id=atmospheric-shell1).

stratosphere, mesosphere and thermosphere (see figure I). The temperature of the atmosphere changes with altitude. In the troposphere (up to the tropopause, at a height of about 12 km), the temperature decreases as altitude increases because of the absorption and radiation of solar energy by the surface of the planet.[148] In contrast, in the stratosphere (up to the stratopause, at a height of nearly 50 km), temperature gradually increases with height[149] because of the absorption of ultraviolet radiation by ozone. In the third layer, the mesosphere (up to the mesopause, at a height of above 80 km), temperatures again decrease with altitude. In the fourth layer, the thermosphere, temperatures once more rise rapidly because of X-ray and ultraviolet radiation from the sun. The atmosphere extends above the mesopause and "has no well-defined upper limit".[150] Accordingly, there is no sharp scientific boundary between the atmosphere and outer space. Above 100 km, only 0.00003 per cent of the atmosphere remains. Beyond that altitude, traces of the atmosphere gradually merge with the emptiness of space.[151]

Figure I

Spheres above the earth



Note: The diagram was drawn by the author with the assistance of Jun Okamoto, based on C. Donald Ahrens, *Essentials of Meteorology: An Invitation to the Atmosphere*, 6th ed. (Belmont, California, Brooks/Cole, 2011).

[148] The thickness of the troposphere is not the same everywhere; it depends on the latitude and the season. The top of the troposphere lies at an altitude of about 17 km at the equator, although it is lower at the poles. On average, the height of the outer boundary of the troposphere is about 12 km. See Edward J. Tarbuck, Frederick K. Lutgens and Dennis Tasa, *Earth Science*, 13th ed. (Pearson, 2011), p. 466; Graham R. Thompson and Jon Turk, *Earth Science and the Environment*, 4th ed. (Belmont, California, Brooks/Cole, 2009), p. 438.

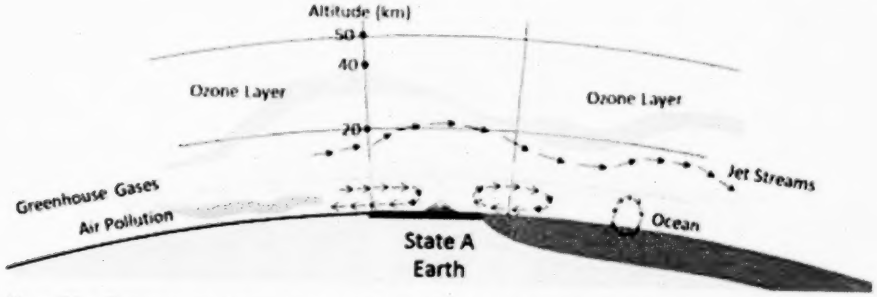
[149] Strictly, the temperature of the stratosphere remains constant to a height of about 20-35 km and then begins a gradual increase.

[150] Tarbuck, Lutgens and Tasa, *Earth Science* (see footnote 148 above), p. 467.

[151] Ibid., pp. 465 and 466.

66. Because of gravity, the atmosphere exerts a downward force on the surface of the earth. Accordingly, as altitude increases, the gases in the atmosphere gradually become more dilute. Approximately 80 per cent of air mass exists in the troposphere and 20 per cent in the stratosphere. The thin white hazy belt (with a thickness of less than 1 per cent of the radius of the globe) that one sees when looking at the earth from a distance is the atmosphere. In the troposphere and the stratosphere, the relative proportions of most gases are fairly stable. Scientifically, those spheres are grouped together as the lower atmosphere,[152] which extends to an average altitude of 50 km, and can be distinguished from the upper atmosphere.[153] The atmosphere moves and circulates around the earth in a complicated manner called atmospheric circulation.[154] The gravitational influence of the sun and moon also affect its movements by creating atmospheric tides.[155] Figure II shows where atmospheric problems such as transboundary air pollution, depletion of the ozone layer and the accumulation of greenhouse gases occur.

Figure II
Atmospheric circulation



Note: The diagram was drawn by the author, with the assistance of Jun Okamoto, based on C. Donald Ahrens, *Essentials of Meteorology: An Invitation to the Atmosphere*, 6th ed. (Belmont, California, Brooks/Cole, 2011), p. 210.

[152] The American Meteorological Society defines the "lower atmosphere" as "generally and quite loosely, that part of the atmosphere in which most weather phenomena occur (i.e., the troposphere and lower stratosphere); hence used in contrast to the common meaning for the upper atmosphere". (http://amsglossary.allenpress.com/glossary/search?p=1&query=lower+atmosphere&submit=Search).

[153] In the same vein, the American Meteorological Society defines the "upper atmosphere" as residual, that is, "the general term applied to the atmosphere above the troposphere" (http://amsglossary.allenpress.com/glossary/search?p=1&query=upper+atmosphere&submit=Search).

[154] Gareth Jones and others, *Collins Dictionary of Environmental Science* (Collins, 1990), p. 40.

[155] Michael Allaby, *Dictionary of the Environment*, 3rd ed. (New York University Press, 1989), p. 34.

67. Both human and natural environments can be adversely affected by certain changes in the condition of the atmosphere. There are three particularly important causes for the degradation of the atmosphere.[156] First, the introduction of harmful substances (namely, air pollution) into the troposphere and lower stratosphere and associated chemical reactions[157] causes changes in atmospheric conditions. The major contributing sources of air pollution are acids (namely, nitrogen oxides and sulphur oxides), carbon monoxide, particulate matters and volatile organic compounds. Ozone) and other photochemical oxidants are produced from a photochemical reaction of nitrogen oxides and volatile organic compounds under the sunlight in the troposphere and produce harmful effects on humans and ecosystems.[158] Strong horizontal winds, for example, jet streams,[159] can quickly transport and spread such trace gases horizontally all over the globe far from their original sources (although vertical transport is mostly slow). It is important to recognize this functional aspect of the atmosphere as a medium for transporting pollutants. Some pollutants that are relatively innocuous while in the atmosphere can have significant deleterious effects when they accumulate in polar regions — both on fauna and flora and, through food chains, on humans, as in the cases of persistent organic pollutants and mercury. Second, chlorofluorocarbons, halons and other halocarbons emitted into the upper troposphere and stratosphere cause ozone depletion. The ozone layer, as its name implies, contains significant amounts of ozone. Ozone has the same chemical structure whether it occurs miles above the earth or at the ground level. It can be "good" or "bad," depending on its location in the atmosphere. The main concentrations of ozone ("good" ozone) are at altitudes of 15-40 km (maximum concentrations occur between 20-25 km). The ozone layer filters out harmful ultraviolet radiation (known to cause skin cancer and other injury to life) from the sun. Third, changes in the composition of the troposphere and lower stratosphere cause climate change. The main source of anthropogenic climate change is the emission of gases (which already exist in trace amounts in the atmosphere), such as carbon dioxide, nitrous oxide, methane and hydro-fluorocarbons. Such greenhouse gases are listed in annex A of the Kyoto Protocol (see para. 33

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[156] See Rudolf Dolzer, "Atmosphere, protection", in *Encyclopedia of Public International Law*, vol. I, Rudolf Bernhardt, ed. (Amsterdam; New York, North-Holland, 1992), p. 290; Charlotte Kreuter-Kirchhof, "Atmosphere, international protection", in *Max Planck Encyclopedia of Public International Law*, vol. I, Rüdiger Wolfrum, ed. (Oxford, Oxford University Press, 2012), pp. 737-744.

[157] Scientifically, pollutants are divided into two types: primary pollutants, substances that are emitted directly from identifiable sources; and secondary pollutants, substances that are not emitted directly into the air, but form in the atmosphere when reactions take place among primary pollutants. After the primary pollutant is emitted into the atmosphere, it combines with other substance(s) to produce other constituent pollutants through solar radiation or by photochemical reactions. See Tarbuck, Lutgens and Tasa, *Earth Science* (see footnote 148 above), p. 464.

[158] See Royal Society, *Ground-level Ozone in the 21st Century: Future Trends, Impacts and Policy Implications* (London, 2008). Available from http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2008/7925.pdf.

[159] Jet streams are narrow air currents, especially westerly winds (namely, flowing from west to east) found in the upper stratum of the troposphere. They move at a high speed of 240-720 km per hour.

above).[160] Conditions within the troposphere heavily affect the weather on the earth's surface, including cloud formations, haze and precipitation. While some gases and aerosols are expunged through a natural cleansing process in the troposphere,[161] and a certain amount of carbon dioxide is absorbed by forests and oceans, emissions can overwhelm these processes causing climate change to occur.

68. The three core international issues concerning the atmosphere — air pollution, ozone depletion and climate change — relate to the troposphere and the stratosphere,[162] although the major contributing factors may differ in each case. One such factor is residence time. While traditional air pollution constituents have a residence time of days to weeks, greenhouse gases, such as carbon dioxide and nitrous oxide, and compounds destroying the stratospheric ozone layer, have residence times that often exceed a century. The upper atmosphere (namely, the mesosphere and thermosphere), which comprises approximately 0.0002 per cent of the atmosphere's total mass, and outer space are of little concern in view of the environmental problems under consideration.

B. Definition of the atmosphere

69. Having briefly described the unique physical characteristics of the atmosphere, it is now necessary to formulate an appropriate legal definition that reasonably corresponds to the scientific definition. Most international treaties and documents do not define "atmosphere", even though it is the object of protection for the purpose of the application of those treaties. Alternatively, such instruments tend to define the causes and effects of damage to the object of protection.[163] It may nonetheless be

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[160] In recent years, however, experts have found that some of the substances in the troposphere are also responsible for climate change. On a scientific basis, chlorofluorocarbons also have greenhouse effects. Such contributions are defined as "a greenhouse warming potential (GWP)" (see Wallace and Hobbs, *Atmospheric Science: An Introductory Survey* (see footnote 146), pp. 453-454).

[161] The aerosols, tiny solid and liquid particles, are "cleansed" or "scavenged" by cloud droplets and ice particles in the troposphere, some of which subsequently fall to the ground as rain or snow (see Wallace and Hobbs, *Atmospheric Science: An Introductory Survey* (see footnote 146 above), p. 11).

[162] Kiss and Shelton, *International Environmental Law* (see footnote 18 above), pp. 556-562.

[163] For instance, in the Convention on Long-range Transboundary Air Pollution (1979), "air" is not defined, only a definition of "air pollution" is given. Article 1, subparagraph (a) defines "air pollution" as "the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment"; and subparagraph (b) defines "long-range transboundary air pollution" as "air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources". The Convention also refers to "substances or energy" in its definition of air pollution (article 1 (a)). Some of the protocols to the Convention, while referring to the "atmosphere" in their preambles, and in their object and purpose clauses, give no definition of the term. The definition of "emission" is given as "the release of a substance from a point or diffuse source into the atmosphere". The United Nations Framework Convention on Climate Change, 1992, defines "climate change" (in article 1, para. 2) as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere". The same article defines "greenhouse gases" (article 1, para. 5) as "those gaseous constituents of the atmosphere, both natural and

noted that in the glossary of *Climate Change 2007: The Physical Science Basis — Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, atmosphere is defined as follows:

> The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1 per cent volume mixing ratio) and oxygen (20.9 per cent volume mixing ratio), together with a number of trace gases, such as argon (0.93 per cent volume mixing ratio), helium and radiatively active greenhouse gases such as carbon dioxide (0.035 per cent volume mixing ratio) and ozone. In addition, the atmosphere contains the greenhouse gas water vapour, whose amounts are highly variable but typically around 1 per cent volume mixing ratio. The atmosphere also contains clouds and aerosols.[164]

70. Once it undertakes the task of elaborating guidelines on the law relating to the atmosphere, the Commission will need to define the atmosphere. In so doing, it may need to address both the substantive aspect of the atmosphere as a layer of gases and the functional aspect of the atmosphere as a medium within which the transport and dispersion of airborne pollutants occurs. The Special Rapporteur thus proposes the draft guideline set out below.

Draft guideline 1
Use of terms

For the purposes of the present draft guidelines,

(a) "Atmosphere" means the layer of gases surrounding the earth in the troposphere and the stratosphere, within which the transport and dispersion of airborne substances occurs.[165]

IV. Scope of the draft guidelines

A. Anthropogenic environmental degradation

71. In clarifying the scope of the project, it is necessary to address the main elements to be encompassed by the draft guidelines on the protection of the atmosphere, leaving no ambiguity as to its coverage. It may be useful to refer to the previous work of the Commission.[166] In general, the articles of multilateral

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anthropogenic, that absorb and re-emit infrared radiation". Such definitions refer to the effects and causes of the damage to the object the Convention aims to protect.

[164] Available from www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-annexes.pdf.

[165] Definitions of other terms will be proposed at later stages, as appropriate. Nonetheless, it may be helpful to give a tentative definition of "air pollution" (which will be discussed in some depth in the second report of the Special Rapporteur). Draft Guideline 1 (b) "Air pollution" means the introduction by human activities of chemicals, particulate matter, biological material or energy that degrade or alter, or form part of a process of degradation or alteration of, the atmosphere, and that have or are likely to have significant adverse effects on human life or health or the earth's natural environment.

[166] See article 1 ("Scope") of the draft articles on the law of transboundary aquifers (2008) (see A/63/10, para. 53), as follows: "The present articles apply to: (a) Utilization of transboundary aquifers or aquifer systems; (b) Other activities that have or are likely to have an impact upon such aquifers or aquifer systems; and (c) Measures for the protection, preservation and management of such aquifers or aquifer systems".

environmental treaties relating to scope refer either to the effects of pollution (significant adverse effects) or to its causes (human activities). However, those two components are complementary to each other, with the "causes" of human activities resulting in certain effects,[167] and vice versa.[168]

72. The proposed draft guidelines only address damage caused by human activities. Accordingly, their scope would not extend to, for instance, damage caused by volcanic eruption or desert sands (unless exacerbated by human activities).[169] The term "human activities" includes not only activities conducted by States but also those conducted by natural and juridical persons.

73. The atmosphere has been used in several ways, most notably in the form of aerial navigation. Acoustic/noise pollution has raised transfrontier problems for airports in border regions, which have been addressed by a number of bilateral treaties and a growing body of judicial cases.[170] Weather modification is another example for utilization of the atmosphere. Scientists have been suggesting various possible methods for active utilization of the atmosphere. Some of the proposed geoengineering technologies (such as solar radiation management and carbon dioxide removal) are relevant if they become realizable. Thus, modalities of the use (or utilization) of the atmosphere should certainly be considered in depth by the present study.

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[167] For example, article 1 of the Convention on Long-range Transboundary Air Pollution (1979) provides that "For the purpose of the present Convention: (a) 'Air pollution' means the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects ..." Principle 1 ("Scope of application") of the draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006) (see A/61/10, para. 66), states that "The present draft principles apply to transboundary damage caused by hazardous activities not prohibited by international law". Article 1 ("Scope") of the draft articles on prevention of transboundary harm from hazardous activities (2001) (see A/56/10 and Corr.1, para. 91) states that "The present articles apply to activities not prohibited by international law which involve a risk of causing significant transboundary harm through their physical consequences".

[168] For example, article 1, paragraph 2 of the United Nations Framework Convention on Climate Change provides that for the purpose of this Convention, "climate change" means "a change of climate which is attributed directly or indirectly to human activity".

[169] In the context of the 1979 Convention on Long-range Transboundary Air Pollution, Iceland even made a premonitory reservation upon signature of the Convention that it "does not take upon itself any responsibility for long-range transboundary air pollution caused by volcanic eruptions in Iceland" (see ECE/HLM.1/2/Add.1, vol. II, annex IV). Note, however, that some regional instruments also cover air pollution from natural causes; for example, article 1, paragraph 6, of the 2002 ASEAN Agreement on Transboundary Haze Pollution, and the African regional framework Agreements.

[170] See, for example, the French-Swiss border, the judgement of the French Court of Appeal at Lyon in the *Cointrin airport* case, *Gazette du Palais*, vol. 74-II (1954), p. 205, followed by a bilateral boundary airport treaty in 1956; see M. Guinchard, "La collaboration franco-helvétique en matière d'aéroports (Bâle-Mulhouse et Genève)", *Annuaire français de droit international*, vol. 3 (1957), pp. 668-677. Multilateral regimes relevant to aircraft noise damage include the 1951 Agreement between the Parties to the North Atlantic Treaty Regarding the Status of Their Forces (United Nations, *Treaty Series*, vol. 199, No. 2678),; for example, see A. C. Kiss and C. C. Lambrechts, "Les dommages causés au sol par les vols supersoniques", *Annuaire français de droit international*, vol. 16 (1970), p. 771. Global technical standards for aircraft noise emissions have been laid down since 1971 by the International Civil Aviation Organization; see P. Davies and J. Goh, "Air transport and the environment: regulating aircraft noise", *Air and Space Law*, vol. 18, No. 3 (1993), pp. 123-135.

74. Obviously, most of the activities so far are those conducted without a clear or concrete intention to affect atmospheric conditions. There are, however, certain activities whose very purpose is to alter atmospheric conditions, namely, weather modification (weather control). While weather modification in warfare has been prohibited under the Environmental Modification Convention,[171] weather control has been experimented with and practised widely since the 1940s to produce desirable changes in weather. The General Assembly addressed the issue in 1960.[172] The goals of weather control range from preventing the occurrence of damaging meteorological events, such as hurricanes or tornadoes, to causing beneficial weather, such as artificial rainfall in an area experiencing drought; or, conversely, to stopping the rain in a designated area where an important event is scheduled to take place. Cloud seeding is a common technique to enhance precipitation; it entails spraying small particles such as dry ice and silver iodide into the sky in order to trigger cloud formation for eventual rainfall. Evidence of its safety is strong, but doubts remain as to its efficacy. The Governing Council of UNEP approved a set of recommendations for consideration by States and other weather modification operators in 1980.[173] If large-scale weather control were to become feasible in the future, there could be harmful consequences. Potential negative implications might include unintended side effects, damage to existing ecosystems and health risks to humans. Such effects, if transboundary in nature, could generate international

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[171] Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, adopted at New York on 10 December 1976, United Nations, *Treaty Series*, vol. 1108, No. 17119, entered into force in 1978.

[172] In paragraph 1 (a) of its resolution 1721 (XVI) C, on international cooperation in the peaceful uses of outer space, the General Assembly advised Member States and other relevant organizations: "[t]o advance the state of atmospheric science and technology so as to provide greater knowledge of basic physical forces affecting climate and the possibility of large-scale weather modification".

[173] Decision 8/7 A of the UNEP Governing Council on provisions for cooperation between States in weather modification, adopted at its eighth session, on 29 April 1980 (see A/35/25, annex I, decision 8/7 A). It may be noted that, as early as 1963, the World Meteorological Organization (WMO) made an important remark cautioning the need for prudent approach to weather modification technologies, stating as follows: "the complexity of the atmospheric processes is such that a change in the weather induced artificially in one part of the world will necessarily have repercussions elsewhere. This principle can be affirmed on the basis of present knowledge of the mechanism of the general circulation of the atmosphere. However, that knowledge is still far from sufficient to enable us to forecast with confidence the degree, nature or duration of the secondary effects to which change in weather or climate in one part of the earth may give elsewhere, nor even in fact to predict whether these effects will be beneficial or detrimental. Before undertaking an experiment on large-scale weather modification, the possible and desirable consequences must be carefully evaluated, and satisfactory international arrangements must be reached". Lada L. Roslycky, "Weather modification operations with transboundary effects: the technology, the activities and the rules", *Hague Yearbook of International Law*, vol. 16 (2003), p. 20.

concern for their injurious consequences.[174] It is suggested that progressive development of international law in this particular area should be pursued.[175]

B. Protection of natural and human environments

75. The draft guidelines should make clear the objects to be protected: natural and human environments. For the purpose of the present draft guidelines, the former is addressed as "the composition and quality of the atmosphere" and the latter as "human health or materials useful to mankind". Since the present draft guidelines are aimed at protecting the atmosphere, the primary concern is obviously the natural environment. However, given the intrinsic relationship between the natural environment and the human environment (which includes not only human health in a narrow sense but also natural vegetation and crops, materials and historical heritage), the draft guidelines should include both. It should also be added that any adverse effects on the environment should be "significant", warranting international regulation.

C. Causes of atmospheric degradation

76. While the present draft guidelines address various aspects of atmospheric degradation, both transboundary and global in nature, the causes of such environmental degradation are diverse. The causes generally fall into two categories, the first of which is the introduction of (deleterious) substances or energy into the atmosphere.[176] The major pollutants are acids (namely, nitrogen

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[174] Peter H. Sand, "Internationaler Umweltschutz und neue Rechtsfragen der Atmosphärennutzung", *Zeitschrift für Luft- und Weltraumrecht* (German Journal of Air and Space Law), vol. 20 (1971), pp. 109-133; see also H. J. Taubenfeld, "International environmental law: air and outer space", in *International Environmental Law*, L. A. Teclaff and A. E. Utton, eds. (New York, Praeger, 1974), p. 195; Edith Brown Weiss, "International responses to weather modification", *International Organization*, vol. 29, No. 3 (1975), p. 813.

[175] It is suggested that the following points may be considered on weather modification: the duty to benefit the common good of mankind; the duty not to cause significant transboundary harm; the duty to perform environmental impact assessments; public participation; the duty to cooperate; exchange of information and notification; consultation; the duty to utilize international organizations; and State responsibility; see Roslycky, "Weather modification operations with transboundary effects: the technology, the activities and the rules", in *Hague Yearbook* (see footnote 173 above), pp. 27-40. See also Ray J. Davis, "The international law of the hydroscopic cycle: atmospheric water resources development and international law", *Natural Resources Journal*, vol. 31 (1991), p. 17 ff.

[176] For example, article 1 of the Convention on Long-range Transboundary Air Pollution provides that "(a) 'air pollution' means the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment ..."; while article 1 of the Agreement between the Government of the United States of America and the Government of Canada on Air Quality provides that "'air pollution' means the introduction by man, directly or indirectly, of substances into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment ...". It should be noted that article 1, paragraph 1 (4) of the United Nations Convention on the Law of the Sea defines "pollution of the marine environment" as "the introduction ... of substances or energy into marine environment" (emphasis added).

oxides), sulphur oxides, carbon monoxide, particulate matters and photochemical oxidants. Ozone depletion occurs as a result of the introduction of (deleterious) substances, such as chlorofluorocarbons and halons, into the atmosphere. In contrast, the main cause of climate change is the emission of greenhouse gases, such as carbon dioxide, nitrous oxide and methane. These gases are not always inherently deleterious to human health; rather, they have an indirect effect. They tend to cause climate change by altering the composition of the atmosphere.[177] Thus, the subject matter of the present draft guidelines, from a causal viewpoint, will include not only the introduction of certain substances but also energy into the atmosphere which would cover the problems of radioactive/nuclear pollution,[178] and will also include the cases of the alteration of the composition of the atmosphere. It bears repeating that the present draft guidelines will not attempt to deal with the specific substances causing such atmospheric degradation.

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[177] For example, article 1 of the United Nations Framework Convention on Climate Change provides that "'climate change' means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". See also article 1, paragraph 1, of the Cairo resolution on transboundary air pollution of the Institute of International Law, 1987, provides that "For the purposes of this Resolution, 'transboundary pollution' means any physical, chemical or biological *alteration in the composition or quality of the atmosphere* which results directly or indirectly from human acts or omissions and produces injurious or deleterious effects in the environment of other States or of areas beyond the limits of national jurisdiction". Available from www.idi-iil.org/idiE/resolutionsE/1987_caire_03_en.PDF.

[178] Questions on radioactive air pollution were debated in the context of the Convention on Long-range Transboundary Air Pollution. While, according to the Government of Germany's explanatory memorandum on the Convention to Parliament ("*Denkschrift zu dem Übereinkommen vom, 13, November 1979 über weiträumige grenzüberschreitende Luftverunreinigung*", Bundestags-Drucksache 9/1119, 2 December 1981, p. 14), radioactive substances are not covered (see also A. Rest, "Tschernobyl und die Internationale Haftung", *Versicherungsrecht* vol. 37 (1986), pp. 612 and 613, the Government of Austria had expressed the contrary view, in a statement during the preparatory work of the Convention in January 1979 suggesting that the scope of the Convention should also include the study of possible negative effects resulting from the peaceful uses of nuclear energy on the environment of a State or States other than the State within which such activities are carried out; in this sense, see also Dietrich Rauschning, "Legal problems of continuous and instantaneous long-distance air pollution: interim report", *Report of the Sixty-Second Conference of the International Law Association* (Seoul, 1986), p. 219; and Philippe J. Sands, *Chernobyl: Law and Communication — Transboundary Nuclear Air Pollution — The Legal Materials* (Cambridge, Grotius Publications, 1988), p. 162 (Convention on Long-range Transboundary Air Pollution definition "clearly wide enough to bring radioactive fallout within the scope of the Convention"). At the global level, the United Nations Scientific Committee on the Effects of Atomic Radiation, established by the General Assembly in its resolution 913 (X) of 3 December 1955 and now operating under UNEP auspices in Vienna, regularly monitors the levels and effects of ionizing radiation irrespective of its origin, including atmospheric emissions from underground tests not prohibited by the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water of 1963. These measurements thus reflect the cumulative impact of transnational radioactive air pollution from an aggregate of sources worldwide; see *Sources and Effects of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2008 Report to the General Assembly with Scientific Annexes* (United Nations publication, Sales No. E.10.XI.3, 2010). On data-sharing by Committee with the International Monitoring System under the Comprehensive Nuclear Test Ban Treaty (New York, 24 September 1996 (see General Assembly resolutions 50/245 and A/50/1027), see M. Weiss, "The global dimensions of atmospheric radioactivity detection", CTBTO *Spectrum*, vol. 17 (2011), pp. 27-29.

D. Linkages with other areas of international law

77. Obviously, the law of the atmosphere is intrinsically linked with other fields of international law such as the law of the sea[179] and biodiversity (forestry, desertification and wetland),[180] as well as international trade law[181] and international human rights law.[182] The present draft guidelines will refer to those interrelationships, as appropriate. However, the linkages will be referred to as far as they are relevant to the other parts of the present draft guidelines.

78. On the basis of the foregoing considerations, the Special Rapporteur's proposal for draft guideline 2 would read as follows:

Draft guideline 2
Scope of the guidelines

(a) The present draft guidelines address human activities that directly or indirectly introduce deleterious substances or energy into the atmosphere or alter the composition of the atmosphere, and that have or are likely to have significant adverse effects on human life and health and the earth's natural environment;

(b) The present draft guidelines refer to the basic principles relating to the protection of the atmosphere as well as to their interrelationship.

V. Legal status of the atmosphere

79. There are five concepts that may be considered applicable to the legal status of the atmosphere: airspace, shared or common natural resources, common property, common heritage and common concern (common interest).[183] Each of the concepts is briefly considered below as to whether and to what extent they are applicable to the protection of the atmosphere.

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[179] See United Nations Convention on the Law of the Sea, article 212 on "pollution from or through the atmosphere", and article 195 regarding the obligation not to transfer pollution between media.

[180] The preamble of the United Nations Framework Convention on Climate Change refers to the negative impact of climate change on natural ecosystems, and article 4, paragraph 1 calls upon State Parties to conserve sinks and reservoirs of greenhouse gases ... including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems. See also article 2, paragraph 1 (a)(ii) of the Kyoto Protocol and the Convention on Biodiversity (1992), United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (1994), and the Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971).

[181] See, in general, Shinya Murase, "Conflict of international regimes: trade and the environment", in Murase, *International Law*, (see footnote 19 above), pp. 130-166.

[182] See, in general, T. Schulze, H. Wang-Helmreich and W. Sterk, *Human Rights in a Changing Climate: Demands on German and International Climate Policy — The Human Rights to Food and to Water* (Heidelberg, Germany, FIAN International, 2011); J. Knox, "Climate change and human rights law", *Virginia Journal of International Law*, vol. 50, No. 1 (2009)

[183] Alan E. Boyle, "International law and the protection of the global atmosphere: concepts, categories and principles", in *International Law and Global Climate Change*, Robin Churchill and David Freestone, eds. (London, Graham and Trotman, 1991), pp. 7-19; see also Jutta Brunnée, "Common areas, common heritage, and common concern", in Bodansky, Brunée Hey, pp. 550-573.

A. Differentiation between airspace and the atmosphere

80. The notion of "airspace" differs significantly from that of the "atmosphere". The two terms cannot be used interchangeably. Airspace is a concept used to signify the spatial dimension where States exercise their jurisdiction or control for aviation and defence.[184] Thus, article 1 of the Convention on International Civil Aviation (1944) provides that "... every State has complete and exclusive sovereignty over the 'airspace' above its territory". Article 2 of the same Convention defines the territory of a State to be the land areas and adjacent territorial waters. The airspace beyond the boundaries of territorial waters is regarded as being outside the sovereignty of any State and is open for use by all States like the high seas (see also the reference to airspace in United Nations Convention on the Law of the Sea, article 2).[185]

81. Airspace refers to a domain,[186] an area-based approach; the atmosphere, in contrast, is a natural resource that flows through national boundaries. In respect of the legal status of the atmosphere, a functional, non-territorial, approach is more appropriate because it is a dynamic and fluctuating substance. Obviously (vertical), delimitation is possible in the case of airspace by drawing lines vertically along territorial borders, but such artificial lines are not useful in the case of the atmosphere (air), which moves beyond borders in line with "atmospheric circulations" and "jet streams". Thus, the atmosphere is a fluid, single and non-partitionable unit, whereas airspace is a static — and separable — spatial domain.

82. Thus, the area-based approach adopted, for instance, by the United Nations Convention on the Law of the Sea (part XII, on the protection and preservation of the Marine Environment) cannot be followed for the protection of the atmosphere. The environmental regulations of the Convention are predominantly based on spatial (territorial) criteria (including, the territorial sea, contiguous zones, exclusive economic zones and the high seas) for allocation of proper jurisdiction to control

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[184] See Stephan Hobe, "Airspace", in *Max Planck Encyclopedia of Public International Law* (2008), and Lisa Tomas, "Air law", in *Max Planck Encyclopedia of Public International Law*.

[185] United Nations Convention on the Law of the Sea, article 2 (Legal status of the territorial sea, of the air space over the territorial sea and of its bed and subsoil):

1. The sovereignty of a coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea.

2. This sovereignty extends to the air space over the territorial sea as well as to its bed and subsoil.

3. The sovereignty over the territorial sea is exercised subject to this Convention and to other rules of international law.

[186] The strict (horizontal) delimitation of airspace and outer space currently seems difficult, if not impossible (whereas the differentiation between the atmosphere and outer space is quite clear, because of the simple fact that there is no air in outer space). There is no agreement as to where airspace ends and outer space begins. Traditionally, two schools of thought existed. One school espoused the theory of the highest altitude of aircrafts while the other espoused the theory of the lowest orbit of satellites (see Nicolas Mateesco Matte, "Space law", in *Encyclopedia of Public International Law*, Bernhardt, ed., p. 555. Bin Cheng for example, asserted that airspace reaches as far as the atmosphere can be found, by interpreting the French text "espace aérien" in article 1 of the Convention on International Civil Aviation. In this theory, the delimitation of airspace and outer space coincides with the differentiation between the atmosphere and outer space. E. R. C. van Bogaert, *Aspects of Space Law* (Deventer, Netherlands, Kluwer Law and Taxation Publishers, 1986), p. 12.

marine pollution, for example, flag-State jurisdiction, coastal-State jurisdiction and port-State jurisdiction.[187]

83. States may nonetheless feel it necessary to refer to the notion of airspace in the project since article 1 of the 1944 Convention on International Civil Aviation reaffirms the rule that "every State has complete and exclusive sovereignty over the airspace above its territory". Although the legal principles, rules and regulations envisaged in the proposed draft guidelines are perhaps most applicable to certain activities conducted on the ground within a State's territorial jurisdiction, there may be situations where the activities in question may be conducted in its airspace.[188] Therefore, the inclusion of a saving clause is proposed to the effect that nothing in the draft guidelines shall affect the legal status of airspace provided in other conventions.

B. Natural resources, shared or common

84. The atmosphere (air mass) is the Earth's largest single natural resource, so listed — along with mineral, energy and water resources — by the Committee on Natural Resources,[189] as well as in the 1972 Stockholm Declaration[190] and in the 1982 World Charter for Nature.[191] It provides renewable "flow resources" essential for human, plant and animal survival on the planet; and, in addition to contributing basic economic production supplies (for example, oxygen and precipitation) as well as waste absorption services (for example, as a sink resource or dilution medium for combustion exhausts), it serves as a medium for transportation and communication

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[187] Myron H. Nordquist, Shabtai Rosenne and Alexander Yankov, eds., *United Nations Convention on the Law of the Sea 1982: A Commentary*, vol. IV, (Nijhoff, 1990), pp. 3-22.

It may be noted, however, that the relevant part contains a provision based on the functional notion of the sea as a common good: article 216 (enforcement with respect to pollution by dumping) provides for so-called "loading State jurisdiction" in paragraph 1: "... reduction and control of pollution of the marine environment by dumping shall be enforced" and in subparagraph (c) "by any State with regard to acts of loading of wastes or other matter occurring within its territory or at its off-shore terminals". It appears that loading State jurisdiction has the same theoretical foundation as State jurisdiction for the protection of the atmosphere under the present draft guidelines.

[188] Annex 16 of the 1944 Convention on International Civil Aviation is entitled "Environmental protection". The ICAO Council has established rules on aircraft engine emissions standards and recommended practices since 1981, with a view to achieving maximum compatibility between the safe and orderly development of civil aviation and the quality of the human environment. These emissions standards establish rules, inter alia, for vented fuel (part II) and emission certification (part III), including emissions limits for smoke and certain chemical particles.

[189] The inclusion of "atmospheric resources" among "other natural resources" by the former Committee on Natural Resources was first mentioned in the Committee's report on its first session (New York, 10 March 1971), section 4 ("other natural resources"), paragraph 94, subparagraph (d). The work of the Committee on Natural Resources (later Committee on Energy and Natural Resources for Development) was transferred to the Commission on Sustainable Development.

[190] "The natural resources of the earth including the air ... must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate" (Declaration of the United Nations Conference on the Human Environment (*Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972* (A/CONF.48/14/Rev.1), part one, chap. I, principle 2).

[191] "... atmospheric resources that are utilized by man, shall be managed to achieve and maintain optimum sustainable productivity" (General Assembly resolution 37/7, annex, para. 4).

("spatial-extension resource").[192] It must be borne in mind that the atmosphere is a limited resource with limited assimilation capacity. The WTO Panel and Appellate Body recognized in the *Gasoline* case of 1996 that clean air was a natural resource that could be depleted. The atmosphere was long considered to be unlimited, non-exclusive and neutral (simply not worth fighting over) since it was assumed that everyone could benefit from it without depriving others.[193] That assumption is no longer valid. Although the atmosphere is not exploitable in the ordinary sense of the word (such as in the context of oil and gas resources), its proper maintenance is necessary for organisms to breathe and enjoy stable climatic conditions; thus, any polluting industry or polluting States in fact exploit the atmosphere by reducing its quality and its capacity to assimilate the pollutants of other industries or States.[194] This rationale underlies, for example, "trade in emission rights". Accordingly, the concept of shared natural resources appears to be applicable in part to the problem of bilateral or regional transboundary air pollution, and common natural resources to global environmental issues relating to the atmosphere.

85. Assuming that the atmosphere is a natural resource, the term "protection" employed in this project may need to be clarified. In the context of the environment, the term is often used (consciously or unconsciously) in two ways: preservation and conservation. "Preservation" means the measures taken to maintain the original state of nature by requiring a total restriction on human activities in a designated off-limits area. "Conservation", on the other hand, means to maintain the state of the environment in a designated area through intentional human activities, for example, a conservation zone for fisheries resources on the high seas. As was indicated in paragraph 73 above, the utilization aspects of the atmosphere are becoming increasingly important and, accordingly, the draft guidelines to be elaborated on the protection of the atmosphere will refer not only to the preservation aspect (in the sense that the international community will strive as much as possible not to change the existing composition and balance of the atmosphere) but also the conservation

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[192] See the terminology coined by Siegfried von Ciriacy-Wantrup, *Resource Conservation: Economics and Policies*, 3rd ed. (Berkeley, University of California Press, 1968), pp. 40-42, and Myers S. McDougal, Harold D. Lasswell and Ivan A. Vlasic, *Law and Public Order in Space* (New Haven, Yale University Press, 1963), at 777-779.

[193] This appears quite similar to the classic 16th-17th century controversy between Hugo Grotius' *Mare Liberum* and John Selden's *Mare Clausum* over whether ocean resources were to be regarded as unlimited or limited. Grotius advocated the freedom of the ocean by asserting that, in light of its nature, the ocean could not be the object of occupation or possession. Therefore, according to the author, a State was not able to assert an exclusive right for fishing, which he thought had to presuppose *dominium* over the ocean. Moreover, in Grotius' view, there was no need to modify this historical construction, for he considered ocean resources unlimited. Accordingly, everyone could exploit fish stocks without infringing on the interests of others under the regime of the freedom of the seas. See, Hugo Grotius, *The Free Sea, Or Disputation concerning the Right which the Hollanders Ought to Have to the Indian Merchandise for Trading*, translated by Richard Hakluyt (Liberty Fund, 2004), chapter 5. In contrast, Selden maintained that States possessed and could possess a part of the ocean as long as they actually exercised their power over that part of the ocean. In addition, Selden disputed Grotius' view by emphasizing that ocean resources were exhaustible and that there was a danger the free use of the ocean would result in their depletion (see John Selden, *Of the Dominion, Or, Ownership of the Sea*, translation of M. Needham (Lawbook Exchange, 2004).

[194] Frank Biermann, "'Common concern of humankind': the emergence of a new concept of international environmental law", *Archiv des Völkerrechts*, vol. 34, (1996), p. 428.

approach, which will aim at achieving sustainability in the utilization of the atmosphere.

C. Common concern of humankind

86. Common property, or *res communis*, refers to areas such as the high seas that are open for legitimate use by all States and that may not be appropriated to the sovereignty of any individual State. The airspace above the high seas is in this sense "common property". However, like sovereign airspace, common property is fundamentally a spatial dimension and is therefore insufficient to deal with the atmosphere as a global unit,[195] as described in paragraphs 81-85 above.

87. The concept of common heritage was employed in the United Nations Convention on the Law of the Sea and in the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. However, Malta's attempt at the General Assembly in 1988 to have the global atmosphere declared part of the common heritage of mankind was unsuccessful. Since "common heritage" implies that a resource must be exploited and conserved for the benefit of mankind as a whole, such designation would usually require a far-reaching institutional apparatus to control the allocation of exploitation rights and benefits. If the atmosphere were treated as part of the common heritage of mankind, it would, in effect, place atmospheric problems under collective management — something widely considered premature.[196]

88. While the concepts of common property and common heritage may not be appropriate indicators of the legal status of the atmosphere, the notion of common concern is, and should be included in its legal status under international law. In 1988, the General Assembly declared, in resolution 43/53 on the protection of global climate for present and future generations of mankind, that climate change was a "common concern of mankind", somewhat mitigating the failure of Malta's proposal. The same concept was incorporated in paragraph 1 of the preamble to the 1992 United Nations Framework Convention on Climate Change. In view of the growing recognition of the linkages between transboundary air pollution and global climate change, application of the concept of common concern to the whole of atmospheric problems should be considered appropriate.[197]

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[195] Boyle, "International law and the protection of the global atmosphere: concepts, categories and principles" (see footnote 183 above) p. 9.

[196] Ibid., pp. 9-10.

[197] The implications of the concept of common concern of mankind in relation to global environmental issues were examined at a meeting of the UNEP Group of Legal Experts held in Malta from 13-15 December, 1990. It has been noted that the "'common concern' concept has at least two important facets: spatial and temporal. Spatial aspect means that common concern implies cooperation of all states on matters being similarly important to all nations, to the whole international community. Temporal aspect arises from long-term implications of major environmental challenges which affect the rights and obligations not only of present but also of future generations" (see "The implications of the "common concern of mankind" concept on global environmental issues", note by the UNEP Executive Director and Secretariat, UNEP Group of Legal Experts meeting, Malta, 13-15 December 1990. This illustrates strong linkages with principles such as intergenerational equity contained in the Rio Declaration on Environment and Development and other international environmental instruments. One application of the concept of common concern has been explored from an ecosystem orientation,

89. The legal content of the concept of common concern is that States can no longer claim that atmospheric problems are within the reserved domain of domestic jurisdiction because the issues now legitimately fall under "matters of international concern". It will certainly lead to the creation of substantive legal obligations on the part of all States to protect the global atmosphere as enforceable *erga omnes*.[198] It may be too early at present to interpret the concept of common concern as giving "all States a legal interest, or standing, in the enforcement of rules concerning protection of the global atmosphere",[199] in view of the absence of appropriate procedural law to implement such an interpretation. It may also be premature to consider the concept of common concern as creating rights for individuals and future generations.

90. Yet, based on the foregoing analysis, it may be concluded that the atmosphere has the legal status of an international resource, whether shared or common, indispensable for sustaining life on earth, human health and welfare, crops and the integrity of ecosystems; and that consequently its protection is a common concern of humankind. It may also be appropriate to add a caveat, so as to avoid any misunderstanding, to the effect that the present draft guidelines are not intended to prejudice in any way the status of airspace already established in international law. Thus, draft guideline 3 would read as follows:

Draft guideline 3
Legal Status of the Atmosphere

(a) The atmosphere is a natural resource essential for sustaining life on earth, human health and welfare, and aquatic and terrestrial ecosystems; hence, its protection is a common concern of humankind;

(b) Nothing in the present draft guidelines is intended to affect the legal status of airspace under applicable international law.

VI. Conclusion

91. In preparing the present report, the Special Rapporteur aimed to provide as thorough and exhaustive a background as possible on the topic, such as its historical development and the sources of law relevant to it, as well as to explain the rationale of the topic and the basic approaches, objectives and scope of the project. It has aptly been said that, "at its best, the International Law Commission's real strength is the ability to take a systematic view of International Law as a whole, to integrate

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e.g., in the context of regional watershed management (see Jutta Brunnée and Stephen J. Toope, "Environmental security and freshwater resources: ecosystem regime building", *American Journal of International Law*, vol. 91 (1997), pp. 26-59).

[198] As the International Court of Justice indicated in the *Barcelona Traction* case, such obligations are owed to the international community as a whole. Because of their importance, they are "the concern of all States" (*Barcelona Traction, Light and Power Company, Limited, Judgment, I.C.J. Reports 1970*, p. 3). In this context, one may also recall the International Law Commission's reference to "massive pollution of the atmosphere or of the seas" as an international crime in draft article 19 of the draft articles on state responsibility in its first reading, although the article disappeared in the final draft adopted on second reading.

[199] Boyle, "International law and the protection of the global atmosphere: concepts, categories and principles" (see footnote 183 above), pp. 11-13.

new developments and different bodies of law and to articulate in its commentaries reasoned and fully researched conclusions".[200] Nonetheless, a number of problems had to be addressed here in a preliminary and general manner, leaving in-depth analysis of specific legal problems for a later stage. The Special Rapporteur hopes that he has been able to show that, with an appropriate approach, the protection of the atmosphere is both an important and proper topic for the codification and progressive development of international law — a topic through which the Commission can contribute significantly to the international community as a whole.

92. As a tentative plan of work to succeed the present first report, the Special Rapporteur hopes to consider, in the remaining two years (2015 and 2016) of the current quinquennium, questions relating to basic principles for the protection of the atmosphere. They will include the general obligations of States to protect the atmosphere, the principle of *sic utere tuo ut alienum non laedas* as applied to transboundary air pollution, as well as principles of equity, sustainable development and good faith. It is hoped that, during the next quinquennium (2017-2021), the Commission will complete its consideration of other related matters, such as international cooperation, compliance with international norms, dispute settlement and interrelationships.

[200] Alan Boyle and Christine Chinkin, *The Making of International Law* (Oxford, Oxford University Press, 2007), p. 172.